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UNITED STATES DEPARTMENT OF THE INTERIOR

*ANNUAL REPORT OF THE
COMMISSIONER OF
RECLAMATION*

*TO THE SECRETARY OF THE INTERIOR
FOR FISCAL YEAR ENDED JUNE 30, 1932*

UNITED STATES DEPARTMENT OF THE INTERIOR

RAY LYMAN WILBUR, *Secretary*

BUREAU OF RECLAMATION

ELWOOD MEAD, *Commissioner*

THIRTY-FIRST ANNUAL REPORT
OF THE
COMMISSIONER OF RECLAMATION

*Transmitted to Congress in pursuance of the Act of June 17, 1902
(32 Stat. 388)*

FOR THE
FISCAL YEAR ENDED JUNE 30, 1932



UNITED STATES
GOVERNMENT PRINTING OFFICE
WASHINGTON : 1932

THE BUREAU OF RECLAMATION

The Reclamation Service was created under the reclamation act of June 17, 1902 (32 Stat. 388), and was organized on July 8, 1902, as a division of the hydrographic branch of the Geological Survey of the Interior Department, with the Director of the Geological Survey as director.

On March 9, 1907, it was separated from the Geological Survey as a field service under the Secretary of the Interior with a separate director.

On December 13, 1913, the Secretary of the Interior issued an order organizing the service into five divisions, each in charge of an official, forming a board known as the Reclamation Commission. The divisions, with officials in charge were as follows: Scientific, statistical and historical division, under the director as chairman; engineering and technical division under chief engineer; law division under the chief counsel; fiscal and accounts division under the comptroller; and the operation and maintenance division under the supervisor of irrigation.

In December, 1914, a chief of construction was appointed and made a member of the Reclamation Commission.

On May 6, 1915, the Secretary of the Interior issued an order effective June 1, 1915, combining the positions of director and chief engineer, and placing the administration of the service under a board or commission of three persons consisting of the director and chief engineer, chief counsel, and comptroller, and establishing an executive field office at Denver, Colo., under the chief of construction, with a supervisor of irrigation at Billings, Mont.

On November 22, 1915, the Secretary of the Interior issued an order effective December 1, 1915, continuing the organization in effect on June 1, 1915, and giving additional duties to the office of the chief of construction at Denver, Colo.

On August 14, 1918, the Secretary of the Interior issued an order placing the administration of the Reclamation Service in charge of the director.

On June 20, 1923,*the name of the bureau was changed to Bureau of Reclamation, and placed in administrative charge of a commissioner.

The Bureau of Reclamation has since remained a bureau under the supervision of the Secretary of the Interior.

LETTER OF TRANSMITTAL

DEPARTMENT OF THE INTERIOR,
BUREAU OF RECLAMATION,
Washington, September 1, 1932.

THE SECRETARY OF THE INTERIOR.

DEAR MR. SECRETARY: I am transmitting herewith the Thirty-first Annual Report of the Bureau of Reclamation, covering the fiscal year July 1, 1931, to June 30, 1932.

Respectfully,

ELWOOD MEAD, *Commissioner.*

Bureau of Reclamation

Director or commissioner	State	Date	Secretary
Charles D. Walcott.....	New York.....	July 8, 1902	E. A. Hitchcock.
F. H. Newell.....	Pennsylvania.....	Mar. 9, 1907	Do. James R. Garfield. W. L. Fisher. Franklin K. Lane.
A. P. Davis.....	Kansas.....	Dec. 10, 1914	Do. John Barton Payne. Albert B. Fall. Hubert Work.
David W. Davis.....	Idaho.....	June 20, 1923	Do.
Elwood Mead.....	California.....	Apr. 3, 1924	Do. Roy O. West. Ray Lyman Wilbur.

THIRTY-FIRST ANNUAL REPORT OF THE COMMISSIONER OF RECLAMATION

WASHINGTON, D. C., *September 1, 1932.*

The area irrigated in 1931 with water from Government works was 2,846,607 acres, an increase of 55,751 acres over that of 1930.

The area cropped was 2,772,184 acres, a decrease of 33,276 acres.

The total value of crops was \$73,960,377, a decrease of \$45,701,443 compared with 1930, and of \$87,219,503 compared with 1929. This marked decrease in crop values was due largely to the agricultural depression and the prevailing low prices of crops.

During the period 1906, when water was first available, and to and including 1931, the cumulative value of crops grown on land irrigated from Government works amounted to \$1,835,889,877.

Construction payments in cash and credits from power and other sources received during the fiscal year 1932 were \$1,504,451.43, a decrease of \$3,290,381.89 compared with the previous year.

Payments for operation and maintenance were \$1,107,708.53, a decrease of \$318,429.51 compared with the previous year.

Total payments amounted to \$2,612,159.96 compared with \$6,220,971.36 in 1931, a decrease of \$3,608,811.40.

Income to the bureau from all sources during the fiscal year was \$5,399,314.94, or \$4,968,351.62 less than in the previous year.

The operation expense for the year was \$1,449,189.74, a decrease from the previous year of \$286,595.17.

Excess of operation and maintenance expense over receipts for the period amounted to \$341,481.21 compared with an excess of expense over receipts of \$309,646.87 for the previous year.

The appropriation available for construction was \$8,415,000.

The amount expended on construction was \$7,255,188 compared with \$10,843,700 the previous year.

The 10-year construction program started in 1927 has been retarded by reason of reduced revenues coming into the reclamation fund, and, unless some additional source can be found, it will be upwards of 15 years before the original 10-year program can be completed. In addition to work heretofore authorized by Congress there is urgent need for the construction of storage dams and reservoirs on many constructed and fully developed private projects. The Boulder Canyon project comes under a separate authorization, and appropriations for this work are made direct from the General Treasury. The bureau has expended for surveys and investigations, construction, operation and

maintenance, and incidental operations, \$272,800,000, distributed approximately as follows:

Surveys and investigations not allocated to primary projects.....	\$2, 800, 000
Construction of irrigation works, etc.....	223, 000, 000
Operation and maintenance.....	35, 800, 000
Incidental operations, plant and equipment, etc.....	11, 200, 000
Total.....	272, 800, 000

The relief act of April 1, 1932, granting to water users on Federal projects a suspension of payment of construction charges that became due in 1931 and one-half of the construction charge for 1932, resulted in a further reduction in reclamation revenues. Accretions to the revolving fund from the sale of public lands was \$430,444.15 and from oil leases \$1,429,272.09, which is a shrinkage of about one-third of the revenues received from these two sources in the previous fiscal year. As a result of reduced revenues the appropriations available for carrying on work in the fiscal year 1933 are estimated as follows:

Direct appropriations.....	\$2, 414, 500
Unexpended balances continued available.....	1, 819, 000
Power revenues.....	325, 000
Funds to be advanced.....	624, 620
Total available.....	5, 183, 120

Federal reclamation, small as it is, has created 42,568 irrigated farm homes supporting a population of 177,281. It has created or aided markedly in the development of 227 project cities and towns, with an additional population of 514,425. As a result of this development there have been erected 723 schools, 778 churches, and 120 banks with deposits of \$116,484,236.

SECOND YEAR'S PROGRESS ON BOULDER CANYON PROJECT

Construction work on Hoover Dam has been pushed at a rapid rate and the contractors, Six Companies Inc., are fully six months ahead of their required progress and are planning to construct the cofferdams and divert the Colorado River through the four diversion tunnels during the winter of 1932-33, one year ahead of the date originally contemplated.

The contractor has erected a sand and gravel screening plant to prepare aggregates for the 4,500,000 cubic yards of concrete that will be required in the construction of the dam, power plant, and appurtenant works. This plant, the largest of its kind that has ever been constructed, has an initial capacity of 500 tons per hour with provision for doubling this output if required. A standard-gage railroad has been constructed from the plant to a large deposit of sand and gravel on the Arizona side of the river about 8 miles above the dam site. The Colorado River is crossed by a timber trestle 850 feet long.

A concrete-mixing plant has been erected near the river and includes four 4-cubic-yard mixers with a capacity of 280 cubic yards of concrete per hour. Provision has been made for the installation of two additional mixers. The entire equipment is automatically controlled with recording devices, giving a visual image of all operations of the plant as well as furnishing a permanent record of the weight of all materials placed in each batch, measurement of water, and time of mixing.

A total of 55 printed and mimeographed specifications has been issued to date in connection with the construction of the Boulder Canyon project, of which 25 have been issued during the present fiscal year. These include plans and specifications for residences; dormitories; schoolhouse; municipal and administration buildings; air conditioning plants; water purification and sewage disposal plants; electrical refrigerators, ranges, water heaters and coolers; garages; streets and alleys; paving; sidewalks; water and sewage systems; bulkhead and Stoney gates and hoists for Hoover Dam; and plate steel outlet pipes 30 feet in diameter. At the close of the fiscal year plans were being prepared for cableways, hydraulic and electric machinery for the power plant, and general layouts for the outlet and penstock tunnels, intake towers and spillways. Concrete investigations were being continued at Hoover Dam, Berkeley, and Denver laboratories. During the fiscal year 20,706,000 kilowatt-hours of electricity were consumed at Boulder City and in connection with the construction work, costing the Government about one-third of a million dollars, or 1.6 cents per kilowatt-hour. Further details of work completed during the fiscal year will be found on pages 4-5 of this report.

The principal contracts awarded during the year covered the purchase of the bulkhead and Stoney gates and hoists. Two 50 by 50 foot bulkhead gates are to be installed at the upstream ends of the diversion tunnels and two 50 by 35 foot Stoney gates to be installed at the downstream ends of the spillway tunnels.

Contracts were awarded to the following firms at prices f. o. b. factory as shown:

Schedules 1 and 2, bulkhead and Stoney gates: Consolidated Steel Corporation, Los Angeles, Calif.....	\$233, 200
Schedule 3, bulkhead gate hoists: Hardie-Tynes Manufacturing Co., Birmingham, Ala.....	60, 395
Schedule 4, Stoney gate hoists: Reading Iron Co., Reading, Pa.....	32, 500

On June 15, 1932, bids were received for the plate-steel outlet pipes comprising four 30-foot diameter main headers reducing to 25-foot diameter, with 13-foot diameter pipes leading to the hydraulic turbines which will eventually be installed in the power plant, and with extensions leading to the outlet works below the dam. The

estimated weight of steel included in this contract is 46,000 tons. The low bid was submitted by the Babcock & Wilcox Co., of New York, the amount being \$10,908,000.

The following appropriations have been made by Congress for carrying on construction work on the Boulder Canyon project:

Date approved	Name of act	Amount
July 3, 1930.....	Second deficiency act.....	\$10, 660, 000
Feb. 14, 1931.....	Interior Department appropriation.....	15, 000, 000
Apr. 22, 1932.....	do.....	6, 000, 000
July 1, 1932.....	Second deficiency appropriation.....	7, 000, 000
July 21, 1932.....	Relief act.....	10, 000, 000

BOULDER CITY

During the fiscal year Boulder City has been transformed from a barren desert to a modern city with paved streets, electric lights, water and sewerage systems, and homes for upward of 5,000 people. With the aid of an abundant supply of water, the grounds surrounding residences and municipal buildings are being planted with trees, shrubs, and lawns. This is lessening the dust nuisance and the discomfort from the excessive heat. The measures that have been taken to safeguard the health of the employees of the Government and the contractors are fully justified and have resulted in a marked improvement in the morale of the men as compared to the trying conditions under which work was carried on during the summer of 1931.

CONSTRUCTION ON RECLAMATION PROJECTS DURING THE FISCAL YEAR

The Owyhee Dam, Owyhee project, Oregon, at present the highest dam in the world, was completed and dedicated on July 17, 1932, and the Thief Valley Dam, Baker project, Oregon, was completed in June, 1932. The parapet wall of the Echo Dam, Salt Lake Basin project, was completed during the fiscal year, and the dam was dedicated on July 13, 1932. Plans and specifications were prepared for power and pumping plants, canal excavation, drainage work, gates and hoists for the Cle Elum Dam, and an elevator for the Owyhee Dam.

The construction of the Cle Elum Dam, Yakima project, Washington, is being continued under contract. Canal construction was continued on the Gooding division of the Minidoka project, Idaho, and on the tunnels and canals of the Owyhee project, Oregon. Power and pumping plants were built on the Grand Valley project in Colorado and the Yakima project in Washington.

Drainage ditches were completed on the Belle Fourche project, South Dakota, and the Lower Yellowstone project, Montana-North Dakota.

During the fiscal year 156 miles of canals, ditches, and drains were completed, making a total to date of 17,623 miles. At the end of the fiscal year the tunnels numbered 142, with a total length of 46 miles. Canal structures numbered nearly 168,000, of which about 2,500 were built during the year. The bureau has laid 4,712,000 feet or 894 miles of pipe. There were completed to date 1,477 miles of road, 120 miles of railroad, 4,044 miles of telephone lines, and 3,308 miles of transmission lines. The various construction activities have involved the excavation of 311,465,707 cubic yards of earth and rock. In building dams and other irrigation structures there have been placed 5,115,964 cubic yards of concrete, involving the use of 5,861,995 barrels of cement.

THE ECONOMIC DEPRESSION AND ITS EFFECT ON RECLAMATION INCOME

Federal reclamation works are built with money taken from the reclamation fund. This is returned to the fund by payments from irrigators, income from power plants, and small sums from other sources. These payments are fixed by contracts between organizations of irrigators and the Government. The principal ones are in two classes:

1. Where the cost is to be repaid in 40 years with no charge for interest.

2. Where the cost without interest is returned by paying each year 5 per cent of the gross crop income. Under crop-production contracts the payments will, as a rule, extend over more than 40 years.

The depression has made it difficult for irrigators to meet these payments, especially if they are burdened with other debts. Many farms are mortgaged; taxes are high. When there is not money enough to pay all the bills the tendency is to pay the bank, the store, and local taxes, but the bureau is asked to wait.

As a rule farmers desire to pay the Government and make sacrifices to do this, but in 1931 so many found farming unprofitable that an appeal was made to Congress for legislation giving a 3-year moratorium on all construction payments. The bureau opposed this. It favored moratoriums to those unable to pay, but believed those able to pay should do so. Irrigators objected to this, saying no one was able to pay. The outcome was a law giving a moratorium of a year and a half, but requiring 5 per cent interest on deferred payments. Subsequent events have shown that the bureau's views on economic conditions were correct. Before the relief bill became a law irrigators had paid approximately \$1,000,000 of the construction charge for 1931. That was about a third of the amount due and more could have paid.

The bureau recognizes, however, that relief was needed by a large percentage of the settlers. With little decrease in farming costs, they had to sell their products for ruinously low prices. The monthly report on a typical project was: Baled alfalfa hay, \$3 to \$4.50 per ton; wheat, 30 cents per bushel; oats, 8 cents per bushel; cotton, 5 to 6 cents per pound; wool, 8 cents per pound; butterfat, 10 cents per pound; eggs, 9 cents per dozen; and chickens, 5 to 9 cents per pound.

The moratorium cut the cash payments of 1931 construction charges down to \$1,000,000. This money was paid prior to the enactment of the relief legislation, and the major portion of the payments will be applied to future obligations. The cash payments of 1932 charges will probably be less than \$1,000,000. The law enables the income from commercial power plants, built as adjuncts to irrigation projects, to be applied on the settlers' construction debts. This will help.

SUGGESTIONS FOR PROJECT BETTERMENTS

While the moratorium bill was pending before Congress a letter was addressed to each project asking for suggestions regarding changes in the present Federal reclamation policy or laws considered advisable.

Replies were received from the representatives of 32 water users' organizations on 19 projects. There were numerous requests for extensions of the repayment period and for a moratorium in payments, ranging from one to five years.

A number of water users' organizations requested a reclassification of their land, in the belief that this would result in a reduction in construction charges. This would not result where contracts call for the payment annually of a lump sum. Water users are obligated to pay this whether or not additional lands are placed in class 6.

A reclassification on some projects is favored because it would adjust payments to changes in soil conditions since the last classification was made. General legislation should be enacted which would authorize a reclassification at 5-year intervals to adjust these inequalities.

Five projects paying on a crop-repayment basis—that is, 5 per cent annually of the gross crop value per acre—requested that the basis of payment be net instead of gross value. This is not feasible and is not in accord with the law. It is difficult enough to agree on gross acre value. It would be impossible to agree on net returns. If, as is suggested, \$20 per acre should be deducted for the cost of growing sugar beets, what should be deducted for the cost of growing and marketing the fruit of an orchard? This was recognized when the legislation providing for this method of repayment was under discussion, and the word "gross" was purposely written into the law.

Another suggestion concerning changes in the crop-repayment plan is worthy of careful consideration, and that is that payment be based on the return of one year instead of on the average of 10 years. A better solution would be to rewrite all crop-repayment contracts and give 40 years for the repayment of construction costs.

Another pertinent suggestion by two water users' organizations and quite in line with action already taken by the bureau was that the operation and maintenance costs be reduced. The bureau had already adopted and put into effect a policy of holding operation and maintenance costs down to the lowest point consistent with maintaining the projects on an efficient operating basis. It is believed that this effort was recognized by practically all the projects being operated by the bureau. It is assumed that the same laudable effort to reduce costs was put forth by those projects being operated by the water users.

There were requests on a few projects for more reservoirs and on others for more drains. These will have consideration when funds are available.

The place which hydroelectric power holds in irrigation project income led one project to urge the extension of an existing power plant and others to suggest investigations of the possibilities of hydroelectric development as a source of revenue.

Other general suggestions were that joint liability be eliminated; that part of the project cost should be paid by the Government; that a credit agency be established for loans to new settlers; and that unimproved farm units should be improved before settlement.

That the new settler should have access to credit in the early years of improving his farm unit has been advocated by the Commissioner of Reclamation for many years. Practically all settlers are handicapped at the start by lack of money to make necessary improvements. Many of them barely meet the minimum requirement of \$2,000 capital. An equal amount of credit is essential. Local banks can loan for short terms only and at a high interest rate. Federal land banks will loan only on improved patented land. Neither meets the needs of the homestead settler on unimproved land. However, this is of less practical importance than a few years ago. The problem now is how to increase the income of the farmer on land settled and improved.

EFFECT OF FEDERAL RECLAMATION ON NATIONAL WELFARE

Economic addresses and press comments about the contribution of Federal reclamation to the agricultural surplus show that the facts are not known or, if known, the relation of reclamation to the national welfare is not realized. These discussions usually credit all the crops grown under private irrigation works to the output of Federal projects.

In fact, the irrigated acreage in the Federal reclamation projects represents only about 7½ per cent of the total irrigated area in the Western States. It is less than one-half of 1 per cent of the cropped area in the entire United States. The value of the crops grown on Federal projects is less than 1 per cent of the total value of all crops grown in the United States. The unimportance of Federal reclamation, so far as it affects agriculture as a whole in the United States, may readily be concluded from these figures of acreage and value. It has been conservatively estimated, however, that Federal reclamation, with an expenditure of \$250,000,000, has created taxable values of at least \$1,000,000,000, and does much to support commerce and industry in other sections of the country. Some of the facts which support this are given in the following paragraphs:

Records compiled recently on 17 of the 29 projects showed that during one year the railroads shipped in 95,000 carloads of manufactured goods, comprising automobiles, farming implements and machinery, furniture, and similar products of eastern and middle western factories, valued at \$120,000,000. The wage earners who produced these goods consumed agricultural products grown not on Federal irrigation projects but on near-by farm land. Furthermore, if the 166,000 people on the Federal project farms had not been engaged in this work of helping to build up the West, many of them would have been on the farms or in the cities of the Middle West and East, contributing to the present problems of an agricultural surplus and unemployment.

Broadly speaking, there is a more or less definite relationship between industry and agriculture in a given locality. Each is complementary to the other and the proper development of one is dependent on the proper development of the other. The development of industry in the West is dependent upon the development of all its resources, not the least of which is water. The Department of the Interior, through the Bureau of Reclamation, is endeavoring to do its part in helping to place this section of the country as nearly as possible on an equality with other more favored regions. This is being done without detriment to the other regions, but, rather, to their benefit.

There is no surplus of many of the crops grown on the Federal irrigation projects. Others are seasonal in nature and come on the market at a time when they can not be produced in other parts of the country except at prohibitive cost. Sugar beets and long-staple cotton, cantaloupes, and iceberg lettuce are examples.

Wheat, one of the chief surplus crops, is grown on the Federal reclamation projects, but the crop is less than one-half of 1 per cent of the wheat production in the United States and is barely sufficient to meet local needs. Alfalfa hay represents more than 31 per cent of

the cropped area of the projects. This hay is consumed locally, supplementing feed on the ranges adjacent to the projects. Winter feed provided by irrigation projects is an indispensable adjunct to the range livestock industry.

Those who oppose reclamation should try to visualize what the western third of the United States would be without it. If the cities and industries of the West are to grow, then irrigated farming must also grow. Water is the great resource of the arid region. On it hinges the future of this section of the country. The Federal Government is the agency able to conserve and make it available. The opportunities for such conservation are too vast for private capital. The Boulder Canyon, the Columbia Basin, and the Sacramento Valley and the San Joaquin Valley projects are examples.

FEDERAL RECLAMATION PROJECTS AS HOMES FOR THE UNEMPLOYED

During the past year the bureau has been repeatedly asked for suggestions as to how to help the unemployed of cities to produce their own food by securing for them a house and access to land on which to grow a garden and keep a cow, pigs, and chickens, the idea being that those so situated could grow their own food and need not be hungry. It will also lessen the curse of enforced idleness, as a man with a garden and some livestock can always keep busy. Something of this kind has been done on reclamation projects where farm workers' homes of 2 to 5 acre plots are provided. But the remoteness of most reclamation projects from centers of unemployment is an objection to a trial of such an experiment by this bureau.

MORATORIUM FOR WATER USERS

In view of the low prices of agricultural products that prevailed during 1931 and the water shortage on certain projects resulting in reduced crop yields, it was recognized that considerable difficulty would be experienced in meeting the payment of construction charges due the United States under existing contracts and, in order to outline comprehensive plans for meeting this situation, a letter was sent to all projects in September, 1931, asking for a detailed report covering the financial situation and the probable ability of the water users to meet payments.

The opinions received in reply to this letter indicated that there were many meritorious cases where relief should be granted, but where it was possible to make payments it was the belief that this should be done.

A conference of representatives of about 20 of the Federal reclamation projects met at Boise, Idaho, October 27-28, and passed resolutions requesting that Congress grant a 3-year moratorium on all

construction charges. Hearings were held in Washington before the Committee on Irrigation and Reclamation of the United States Senate January 25-27, 1932, and, after giving due consideration to all of the conditions connected with Federal reclamation, Congress passed the relief act of April 1, 1932, which provided for a moratorium on the 1931 construction charges and one-half of the construction charges to become due in 1932, with the proviso that such charges would draw interest at the rate fixed by the Secretary of the Interior, which was 5 per cent per annum until paid. The act further provides that in order to receive this relief the acceptance must be indicated by the water users' organization or individual that has contracted to repay construction charges to the United States. At the end of the fiscal year 1932 applications had been filed and extensions granted for payment of approximately \$1,250,000 of construction charges, and additional applications were pending which involved an extension of about \$1,750,000.

ADJUSTMENT CONTRACTS

ORLAND PROJECT, CALIFORNIA

On June 30, 1932, negotiations were pending with the Orland Water Users' Association for the receipt by the water users of the Orland project of the benefits of the act of Congress of May 25, 1926, but definite results had not been reached.

GRAND VALLEY PROJECT, COLORADO

On September 10, 1931, a contract was executed with the Orchard Mesa Irrigation District, Grand Valley project, by which the district was permitted to pay its construction payments in the longer period permitted by the act of May 25, 1926, and the district's land was classified according to its productivity, the district agreeing to assess the better land at higher rates than the poorer land in order to obtain funds to meet its indebtedness for the project.

UNCOMPAHGRE PROJECT, COLORADO

On August 4, 1931, a contract was made with the Uncompahgre Valley Water Users' Association in accordance with the act of Congress of January 31, 1931 (Private, No. 300), permitting the water users to collect and retain the construction charges otherwise payable to the United States during a 6-year period on condition that the amounts so collected are devoted to the construction of a drainage system for the project. The time for completing the payment of construction charges to the United States was correspondingly extended as permitted by the act of January 31, 1931.

BOISE PROJECT, IDAHO

After extended negotiations a contract dated June 30, 1932, was executed with the Emmett Irrigation District, Black Canyon division, Boise project, by which, on condition of the district's reducing its bonded and private indebtedness to somewhat less than 50 per cent of the face value thereof, the district was permitted, among other things, to complete the payment of its construction-charge indebtedness in 69 equal semiannual installments.

MILK RIVER PROJECT, MONTANA

In July and August, 1931, contracts were made with the five irrigation districts in the Chinook division of the Milk River project (viz, the Alfalfa Valley Irrigation District, the Fort Belknap Irrigation District, the Harlem Irrigation District, the Paradise Valley Irrigation District, and the Zurich Irrigation District) by which these districts were allowed the privilege of paying their construction charges within the maximum period permitted in the act of Congress of May 25, 1926.

CARLSBAD PROJECT, NEW MEXICO

On June 30, 1932, negotiations were pending with the Carlsbad Irrigation District, Carlsbad project, for the obtaining by the district of the benefits of the act of Congress of May 25, 1926. An irrigation district was formed for this purpose, the water users having previously been represented by the Pecos Water Users' Association. If these negotiations result in the execution of a contract with the district, the time within which the water users may pay their construction charges will be extended as permitted by the act of May 25, 1926, and the district will take over the operation and maintenance of the project.

KLAMATH PROJECT, OREGON-CALIFORNIA

On June 30, 1932, negotiations were pending with the Langell Valley Irrigation District, Klamath project, by which its construction charges for the first years after the making of a proposed contract with the United States would be reduced, and later charges correspondingly increased under the provision of the act of Congress of May 25, 1926, it being a condition of the negotiations that the district is to meet its warrant and other non-Government indebtedness so as to put its finances on a cash basis.

YAKIMA PROJECT, WASHINGTON

On June 30, 1932, negotiations were pending with the Grandview Irrigation District, Yakima project, by which the district, if contract is executed in pursuance of the negotiations, will be given the privilege of paying only a small part of its construction charge indebtedness during 1932, and to complete the payment thereafter in the maximum

period allowed by the law, if during 1932 and the first half of 1933 the district landowners succeed in reducing their mortgage indebtedness so that the longer period of payment will inure to the benefit of the landowners rather than to the benefit of their mortgagees.

On June 7, 1932, a contract was made with the Granger Irrigation District by which the period within which the district was, under its contract with the United States of November 20, 1922, to make payment of its construction charges was extended to embrace the maximum period permitted by the act of Congress of May 25, 1926.

On January 1, 1932, a similar contract was made with the Prosser Irrigation District adjusting its payments as fixed in the previous contract of December 1, 1917, as amended, so that the payments in the immediate future will be small and the subsequent payments correspondingly increased. July 11, 1931, a similar contract was made with the Snipes Mountain Irrigation District.

On June 30, 1932, negotiations were pending with the Sunnyside Irrigation District for similar concessions on condition that the district reduce its outstanding bonded indebtedness, but contract had not been executed with the district at the end of the fiscal year.

POWER DEVELOPMENT AN IMPORTANT FACTOR IN FUTURE EXTENSION OF RECLAMATION

At the time of the approval by President Roosevelt of the reclamation act on June 17, 1902, little, if any, thought had been given to the utilization of hydroelectric power except as an aid in lowering the cost of construction. In these early days of Federal irrigation, and, in fact, until recently, power plants were built by the bureau only when power could be used advantageously in canal construction or when a need was foreseen to pump water to high lands.

Typical cases of such early power developments are the Roosevelt power plant on the Salt River project in Arizona built to provide power for construction of Roosevelt Dam; the Boise River power plant on the Boise project in Idaho to provide power for the construction of Arrowrock Dam; the Lahontan power plant on the Newlands project in Nevada to provide power for the construction of Lahontan Dam; the Spanish Fork power plant on the Strawberry Valley project in Utah to provide power for the construction of Strawberry Tunnel; and the Lingle power plant on the North Platte project in Nebraska to provide power for the construction of canals on the Fort Laramie division. The Minidoka power plant on the Minidoka project in Idaho was the first development to provide power for pumping irrigation water.

More recent power developments to provide cheap power for construction work and irrigation pumping are the Siphon Drop power plant on the Yuma project in Arizona-California; the Black Canyon

power plant on the Boise project in Idaho; the Pilot Butte power plant on the Riverton project, and the Shoshone power plant on the Shoshone project in Wyoming. Only in one instance has a power plant been constructed on a reclamation project for a purpose other than cheap power for irrigation pumping and construction. The Guernsey power plant on the North Platte project in Nebraska-Wyoming was constructed to return part of the cost of the storage and power development.

Frequently water can be delivered to lands more economically by means of pumping than by gravity. Such conditions are encountered to a greater extent on the later and more difficult projects than on the earlier projects. Cheap power is a requisite for irrigation pumping, and several of the larger hydroelectric power plants were built primarily for pumping purposes. The power plant on the Minidoka project is the pioneer of such development. The Black Canyon power plant on the Boise project, Idaho; the Siphon Drop power plant on the Yuma project, Arizona-California; and the Prosser power plant on the Yakima project, Washington, were all undertaken primarily to provide cheap power for irrigation and drainage pumping.

After the completion of construction there was naturally a trend toward a power consciousness on the part of the new settlers who found power lines stretching along the canal banks, inviting use as the main lines of a power distribution system reaching to the individual farms. Most water users were eager to avail themselves of the added comfort and convenience afforded by a hydroelectric development already started at their very doors. Growing industries in the project towns and beyond the project boundaries added their pleas for the purchase of power for private and municipal use.

Hence, instead of scrapping the existing power lines and plants, these facilities were in general utilized by local organizations of farmers to retail to their members electricity purchased at wholesale from the bureau. In other instances companies were formed to install distribution systems and serve these developing farming communities, or established public utilities bought power at wholesale to retail to their customers.

On some projects it was wholly feasible to develop additional power by utilizing completely the available head at storage dams, in canal drops, and at other appropriate points. As long as the development was confined merely to that amount of power needed for construction or for high-line pumping, the cost of the plants built for these purposes was included in the total construction cost of the project, which the water users obligated themselves to repay, no distinction being made between the power plant and other irrigation works so far as repayment was concerned. The water users on the

Salt River project have received the total revenue derived from the power system on that project since 1917, when the project was turned over to them to operate in accordance with their contract with the Government.

When these plants began to be expanded or constructed, not primarily as an integral part of the irrigation system for construction and pumping, but for the profit which would result from building commercial power plants to provide an increasing source of revenue to help pay for the irrigation works, the question as to who was entitled to the net profits after the works were paid for assumed a very different and more important aspect. This question was given consideration by Congress and on December 5, 1924, the fact finders act was passed, which provides in Subsection I of section 4 as follows:

That whenever the water users take over the care, operation, and maintenance of a project, or a division of a project, the total net profits * * * derived from the operation of the project power plants * * * shall be credited to the construction charge of the project or a division thereof, and thereafter the net profits from such sources may be used by the water users to be credited annually, first on account of project construction charge, second on account of project operation and maintenance charge, and third as the water users may direct.

The net power revenues on the Strawberry Valley, Newlands, Minidoka, and North Platte projects are being credited to the water users in accordance with this act, and as a result the water users on these projects have been relieved of a very substantial part of their annual construction payments to the Government. The water users on the Minidoka project have elected to use their power profits to purchase additional storage, and to provide additional power plant capacity and enlargement and betterment of the irrigation and drainage systems. The revenues from the Siphon Drop plant on the Yuma project are being distributed in accordance with special public notice agreements.

Since the act of December 5, 1924, Congress has passed special supplemental legislation under which the net power revenues from the Black Canyon power plant on the Boise project, from the Prosser plant on the Yakima project, and from the Shoshone power plant on the Shoshone project, are applied in accordance with the provisions of this special and more recent legislation, first, to the repayment of the cost of the power system; second, to the repayment of part or all of the cost of certain irrigation features; and third, after these costs are repaid the net revenues are to go to the reclamation fund. The net power revenues on the Riverton project are being applied in accordance with the policy adopted by Congress for the Black Canyon and Shoshone power plants, although there is no special legislation applicable to the Riverton project. On these projects the water users are relieved of repaying the cost of a part of the

irrigation works, which are to be repaid out of power revenues, and after the cost of these features has been repaid, the reclamation fund will receive a substantial income which will be available for the construction of additional projects.

On one of these power-favored projects the net revenue from the sale of commercial power is larger than the contract payments required from irrigators. The income from the Shoshone, Riverton, and Guernsey power plants in Wyoming and the Minidoka in Idaho are destined to be largely increased with the growth of population in the vicinity of these projects. If, after these power plants have been paid for, these revenues can be devoted to the building of new projects in the States where located, it will hasten the construction of works now badly needed and will strengthen the claim that reclamation is a business undertaking.

POWER DEVELOPMENT AND POWER INCOME

Twenty hydroelectric power plants on 11 of our 29 Federal reclamation projects were in operation during the fiscal year 1931-32. These plants have a total installed generator capacity of 102,550 kilowatts, and they generated 331,739,500 kilowatt-hours of energy, of which 21 per cent was utilized for irrigation and drainage pumping, 65.4 per cent was sold for commercial and industrial uses, and the remainder, or 13.6 per cent, was used for miscellaneous purposes and consumed by losses. Eleven of these plants were operated directly by the water users, and nine, having a total installed generating capacity of 31,500 kilowatts, were operated by the Government. The following table shows the net power revenue for the fiscal year, the accumulated net power revenues from beginning of operations to June 30, 1932, and the disposition of the power revenues for the nine power plants being operated by the Government on Federal reclamation projects.

Results of power operations of power plants operated by Bureau of Reclamation

Project	Net power revenue, fiscal year 1931-32	Accumulated net power revenues to June 30, 1932	Remarks
Boise.....	\$89,940.38	\$352,970.60	Net power revenues applied to repayment of cost of Black Canyon power plant, one-half cost Black Canyon diversion dam and cost of Deadwood Reservoir.
Minidoka.....	112,631.88	1,246,157.11	Net power revenues credited annually to Burley and Minidoka Irrigation Districts and used for purchase of additional storage, increasing water supply and power development, and drainage.
North Platte...	177,856.01	866,561.95	Net power revenues credited annually to 4 irrigation districts and other lands in proportion to acreage.
Riverton.....	-7,918.52	-35,035.09	Net power revenues applied to repayment of cost of Pilot Butte power plant, transmission lines, and portion of cost of main canal, diversion and storage works.
Shoshone.....	31,425.99	263,988.61	Net power revenues applied to repayment of cost of Shoshone Reservoir and power plant.
Yuma.....	56,231.11	256,754.51	Net power revenues credited annually to construction charges on lands of Valley division. In 1932 these lands will receive a credit of \$1 per acre.
Total.....	400,166.85	2,951,397.69	

The net profits from the Hoover Dam power plant, after the works are all paid for, are estimated to be about \$7,000,000 a year. In other words, the power profits from a single Government power plant will largely exceed the present yearly income of the reclamation fund from all sources and that is only one of the important power developments destined to be built as adjuncts to irrigation within the next quarter of a century.

The complete development of the power possibilities of future projects and the extension of plants on present projects, where there is an evident demand for the power for domestic and industrial purposes, and the allocation of the new power revenues in accordance with the recent policy of Congress will afford a source of construction revenue of steadily increasing importance and insure the continuance of the Federal reclamation policy. This policy should be made of general application by appropriate legislation.

The plans for the Boulder Canyon project are in accordance with the above principle, except that payments from power revenues are to be made to Arizona and Nevada as an offset to revenues these States would otherwise receive from taxation. After the repayments to the United States of all money advanced, with interest, the revenues derived from the sale of power at Hoover Dam are to be kept in a special fund to be expended within the Colorado River Basin as may hereafter be prescribed by Congress.

POWER POLICY

What should be the policy of the Government with relation to the income from these commercial plants built as adjuncts to irrigation development? The position of the bureau is that the profits from these power plants should be applied—

1. To the repayment of the construction cost of the power system.
2. To aid in repayment of the construction cost of the dam or other structure which creates or makes possible the power development.
3. To be covered into the reclamation fund to be used as other moneys in this fund in the construction of additional works.

The reason for this policy is that in every case these works have been wholly built at the cost of the Government. Irrigators under these projects have advanced no part of the money for their construction, and in some of the recent works have not obligated themselves to pay any part of the construction. Where they have obligated themselves such payments have not been required because the income from the power plant has more than met the repayments on its cost required by the Government. If the income from these power works is to be given to the water users under the projects, it will be made as a gift. The revenues will furnish a perpetual income for which no investment was made and which benefit is not shared by the irrigators on projects where power development is not possible.

The position of the bureau is that these commercial power plants should be the perpetual property of the Federal Government; that after they have been paid for out of power revenues the water users have no further claim on the power plants or their revenues. Because of the fact that the first small plants built for construction purposes were turned over to the water users those dwelling under the larger commercial plants insist that they shall also be turned over to them and that they have the revenues to put in their pockets as a perpetual dividend on the investment not made by them but by the Government.

There is need for a definite policy applicable alike to all future Federal reclamation projects, involving power developments, to control the construction of power plants and related features where needed either to provide cheap power for use in construction, for irrigation and drainage purposes, or to produce and dispose of surplus power for commercial and industrial uses, as a means of providing revenues to repay the cost of the power development as well as part of the cost of the irrigation development, thereby relieving the water users of some of the financial burden which otherwise they would have to bear. The policy should also provide for disposition of the power revenues.

The Bureau of Reclamation has taken the position that the power plants which are built with Government funds or which utilize power opportunities created by such expenditures should be the perpetual property of the Federal Government and that the profits resulting therefrom should be used to further the work of reclamation.

Some of the more recent appropriation acts for certain projects established a new plan for the disposition of power revenues under which they are applied, first, to the cost of operation and maintenance of the power system and, second, to the repayment of the cost of the power system and other related works, and after these costs have been repaid then the net power revenues are to go into the reclamation fund. This plan has several advantages over the original plan. It relieves the water users of the obligation to repay part of the project costs which are to be repaid out of power receipts. Eventually after the costs of the power systems have been repaid the reclamation fund will receive substantial revenues from power which will enable reclamation work to proceed at a faster rate than would otherwise be possible. Water users on projects having power income and on projects having no power income would be placed on a more nearly equal basis.

REMEDIAL LEGISLATION REQUIRED

It is hoped that the next Congress will enact legislation to determine the disposal of power revenues and that this claim of the water users

on power plants to have these revenues as a profit on the investment made by the Government will be finally disposed of.

Whether there should be some restriction which would give the State where the power plant is located the preferred claim on those revenues to be used in reclamation in that State is worthy of consideration, the theory of such claim being that the State is entitled to a part of this power profit in lieu of taxes on the Government plant which it can not impose. But the main thing is that these profits will lighten the burden on irrigators in the building of works of high acreage cost in the future. Without such a remedy many of the most valuable works will not be financially feasible.

A RECLAMATION POLICY FOR THE IMMEDIATE FUTURE

The Reclamation Bureau is confronted by two conflicting conditions. One is that causes heretofore referred to have created a large shrinkage in the reclamation income. The total construction income of the reclamation fund for 1933 is about \$3,000,000. For 1934 it will be about \$4,000,000 if there is no further moratorium.

The 10-year construction program adopted in 1926 contemplated an expenditure of \$10,000,000 a year from income, and on a \$10,000,-000 yearly expenditure it would require 10 years to complete the projects already under construction or authorized by Congress. To carry out this program with the present income will double the time contemplated. All the money available for 1933 or 1934 could be profitably spent on a single reservoir.

With the fund thus depleted we are confronted, on the other hand, with requests in greater numbers than ever before for investigations looking to the rebuilding of older irrigation canals or the construction of reservoirs to increase the water supply. These requests are not for investigations to determine how unpeopled desert land can be reclaimed but to determine how the people living in old-established irrigation districts and on highly improved farms can obtain a water supply sufficient for their needs.

The shortage of water in fully settled districts has been made more serious by changes in economic conditions in the West. When the reclamation act was passed 30 years ago the great problem of private development was to get water out of the streams onto unpeopled desert lands. In that work immense sums of money, raised by the sale of bonds or contributed by incoming settlers, were used to build works. Reduction in first cost was an important consideration. For a considerable time after the passage of the reclamation act the area of desert land reclaimed by private and district works far exceeded that supplied with water from Federal projects.

RECLAMATION BUREAU SUPPLEMENTS PRIVATE DEVELOPMENT

The Reclamation Bureau supplemented this private development with larger, costlier, and more permanent works. Many of these first works were built to rescue private projects. Now, 30 years later, irrigation is confronted with the fact that development by private enterprise has ceased because it is unprofitable, while the growth of population has made a great increase in the use of water. Take, for instance, the city of Los Angeles. It has absorbed the irrigation water of the Owens River Valley. It has made large inroads on irrigation supplies in near-by valleys and is now compelled to go to the Colorado River to obtain the water essential to its future growth. Sacramento, Salt Lake, and Denver, as they have grown, have required additional water. This water comes in part from water originally appropriated for irrigation.

Changes in the economic life of the arid region are increasing the consumption of water. To meet this, works for conserving flood waters must be built. More people and higher standards of living are changing the practices of irrigated farming. They have created a market for crops that can only be grown by skillful cultivators and through costly methods. Acres that were once in grain are now devoted to orchards and market gardens. These new and costlier crops require more water for late irrigation than the grain and hay crops of the pioneer. The older irrigation works, where the main idea was to build cheaply, do not meet these exacting requirements. Some are too small, some are unsafe, and must be rebuilt, and, above all, there are few valleys where additional reservoirs are not a necessity.

The districts confronted with this situation are not able themselves to raise the money for these improvements nor can they obtain it from private loans. Private and district irrigation development have almost ceased. There is no present market for irrigation bonds. Few of the arid States are financially able to aid in the reconstruction of these works and a majority are prohibited by constitutional limitations. Irrigators therefore look to the Federal Reclamation Bureau for rescue.

Some of the older developments are faced by water shortages due to the larger use of early priorities. The people along a river like the Arkansas, the Platte, or the Snake are bound together by their common tie of dependence on the river. In the early days when rights to water were being established the future significance of this was not realized and the earlier rights gave titles to more water than had actually been used, the idea being that they would provide for any ultimate requirements later on. The right to sell these priorities was upheld by the courts of some States, and so, either through sales

and transfer to other lands, or the enlargement of the area irrigated under the original works, the consumption of water controlled by early rights absorbs the entire natural flow and thus, takes it away from farms once irrigated under later rights.

WESTERN INDUSTRIES GROWING FASTER THAN WESTERN FARMS

To meet this situation and prevent the wholesale impoverishment and abandonment of highly improved farms the Bureau of Reclamation is being called upon to work out programs for protecting and preserving existing developments. Some of the most urgent appeals come from areas like the San Joaquin Valley in California, the Salt Lake Valley in Utah, and the Platte and Arkansas valleys in Colorado, Wyoming, and Nebraska. Any proposal to provide additional funds to meet these needs is met by opposition. Many who do not understand conditions believe that it would increase the agricultural surplus and they seek to place an embargo on all further conservation of water for irrigation. Newspapers carry headlines "Reclamation a Detriment," "Grange Opposes Irrigation Projects," and in these discussions all irrigation canals are treated as evils, every reservoir as a menace, and the crop-growing irrigator as a public enemy. This attitude comes from lack of understanding of western conditions and a mistaken belief that the main result of the works desired would be to add new land to the cultivated area and increase the agricultural surplus. No one in the West desires this. What is sought is to preserve farms already established, to complete development already begun and on which large sums of money have been spent, and to save to the men living on western farms the fruits of their expenditures and their toil.

Increase in the irrigated area would be so insignificant that it would have no perceptible influence on the total crop production of the country. Some land would necessarily be added to the irrigated area within a district, but it would be so small in amount that it would not injuriously affect any part of this country. This fear of injurious competition with existing farms will disappear when the operations of the bureau are better understood, when it is realized that the increase in irrigated products for the past five years has not kept pace with the increased demands for these products in western cities. Western industries are growing faster than western farms, and that growth makes the cities an invaluable market for eastern factories and eastern products. The prosperity of the West causes a reflex prosperity in the East, while crop losses growing out of defective water supplies, the abandonment of farms, decline of

population in western irrigated valleys must cause an economic loss to both western cities and eastern factories. So far as crops are concerned, the loss of these farms or their preservation will not affect the surplus problem of the whole country.

Because of the character of the opposition to irrigation public opinion instead of being informed is being misled. The suffering from recurring water shortages is not realized, and there is danger that many families will be impoverished and farms abandoned before the real situation is understood. If farmers in the humid parts of the country were faced with a situation where they could not count on rain after July, they would more readily understand the needs of these pioneer communities which seek reservoirs to supply them with water during that period.

The question is, What ought to be done? It is a situation which primarily concerns the West and which can be improved only by the active influence of an aroused public opinion. The mistaken apprehensions of harm need to be removed by argument, persuasion, presentation of facts. That there should be more interest in this matter by the Western States as a whole is apparent to anyone who understands the present situation. The National Government thus far has done everything. It has furnished the money, recommended the appropriations, and defended the results. The Western States have been the beneficiaries, present and prospective. What, then, should the Western States do to support and assist in this great work? It involves a question of State cooperation and support of national irrigation. The spirit of cooperation exists; the question is, How can it be shown and made effective? No means should be neglected for insuring the continuation of this work. How can the humid sections of the country be convinced that reclamation is really a business enterprise, that it is the desire of both irrigators and the Western States that the money advanced shall be repaid?

CONTRACTS FOR REPAYMENTS SHOULD BE FULFILLED

The conditions of repayment required under our Federal reclamation laws are more liberal than those of any other country. While government construction of reclamation works is a national policy in every arid country, the United States is the only one which does not require the payment of interest on the money advanced. Because of this generosity and because the money goes wholly to the upbuilding of one section of the country there is a special obligation resting on the Western States to see that the contracts made for repayment shall be fulfilled, except where conditions make this economically impossible, and where they would justify relief in any section of the

country. If the subject is approached in this attitude, it is believed that the money needed to complete half-built works, the money needed to rescue communities from the losses and disappointments of an inadequate water supply, will be provided, and the Reclamation Bureau can, in the next 10 years, be made a greater instrument for the upbuilding of the West, city and country, than ever before.

FARM UNITS OPENED TO ENTRY

One hundred forty-two public-land farm units, containing a total irrigable area of 6,384 acres, were opened to entry during the fiscal year as follows:

November 9, 1931, Tule Lake division, Klamath project, Oregon-California, 68;

November 19, 1931, Gravity division, Minidoka project, Idaho, 23;

February 15, 1932, Belle Fourche project, South Dakota, 1;

March 7, 1932, Bully Creek East Bench, Vale project, Oregon, 3;

June 1, 1932, Pavillion and Pilot divisions, Riverton project, Wyoming, 43;

June 20, 1932, Greenfields division, Sun River project, Montana, 4.

At each of these openings ex-service men were accorded the usual 90-day prior right of entry, subject, of course, to the provisions of the regulations of the Department of the Interior, which require that each prospective settler shall have a minimum capital of \$2,000 or its equivalent in livestock, farming implements, or other assets deemed to be as useful to him as cash, and that he shall have had at least two years' farming experience.

Throughout the year there was a demand for farm homes on the Federal irrigation projects, and many of the units opened were filed upon by carefully selected settlers. At the close of the year there were still available a number of farms on the Willwood division of the Shoshone project, Wyoming, and on the Pavillion and Pilot divisions of the Riverton project, in the same State, although interest in these projects had greatly increased by reason of the active campaigns that were waged by the railroads, the chambers of commerce, and other local organizations, as well as the Department of Commerce and Industry at Cheyenne, Wyo., all of which were anxious to help settle the vacant lands as rapidly as possible with desirable farmers.

CONTRACTS

The following summary shows the nature of the contracts entered into by the bureau during the fiscal year, their number, and the amounts involved:

Nature of contracts	Number of contracts	Amount involved
Cooperative investigations.....	4	\$36,000.00
Supplies.....	787	340,907.93
Material.....	367	1,429,415.28
Equipment.....	138	472,254.58
Miscellaneous services.....	134	109,511.51
Construction work.....	73	3,282,276.74
Land purchases, including improvements.....	102	414,680.79
Land sales, including improvements.....	8	5,455.00
Leases to the United States.....	21	17,022.00
Leases from the United States.....	343	¹ 600,588.50
Compromise of damages.....	19	4,862.58
Rental of Government equipment.....	15	2,349.75
Rental of water.....	333	169,168.93
Sale of surplus electrical energy.....	32	976,881.93
Sale of water rights under the Warren Act.....	9	171,635.00
Sale of water rights within projects.....	11	1,203,212.53
Adjustment and relief.....	3	106,857.73
Miscellaneous.....	335	² 75,905.76
Total.....	2,734	³ 9,418,986.54

¹ Includes 74 business and residence leases at Boulder City.

² Includes 201 business permits at Boulder City.

³ Estimated in part.

ECONOMIC AND ENGINEERING OPERATIONS

SALT RIVER PROJECT, ARIZONA

Economic.—In spite of the economic depression the Salt River Valley Water Users' Association has by careful management kept its finances in a sound condition and by reducing operating costs and the utilization of its excellent credit has lowered assessments and afforded much needed relief to its shareholders. Existing short-term indebtedness and all project construction payments due the Government were covered by a \$3,000,000 6 per cent bond issue sold on a favorable basis in 1931, and congressional legislation in 1932 has afforded further relief by postponement of additional payments. An encouraging factor in the situation is the improved water storage, resulting in a large saving in pumping expense and expenditures required during recent dry years for the purchase of steam power, besides allowing a more generous apportionment of water to the lands. The prices prevailing for farm commodities, however, have reduced the farmers' incomes in many cases to less than the cost of production, and, notwithstanding lower overhead expense, have created an extremely critical condition, resulting in the foreclosure of a number of mortgages and in difficulty in meeting assessments; although in spite of this, delinquencies amount to less than 8 per cent.

While the condition of the water users' association is thoroughly sound and its credit is of the highest order, there is no doubt that, as far as the individual farmers are concerned, the level of prosperity is lower than at any time in the history of the project. Past experience has shown conclusively the folly of following a 1-crop program, and the present practice of diversification of crops is one of the principal

reasons why the present depression has not been more disastrous. As it is, gross crop returns for 1930-31 were 60 per cent of 1929-30 and 40 per cent of 1928-29. Business conditions in Phoenix reflect general trends on the project and are indicated to a considerable extent in the figures on building permits, which for 1931 were approximately one-half the previous 4-year average. No new major construction work has been in progress other than the activity of the State highway department, which expends from \$5,500,000 to \$7,000,000 on highway construction and maintenance. A new bridge across Salt River at Tempe was completed in 1931 at a cost of \$500,000.

The city of Phoenix in January, 1932, completed a water-supply improvement program under a \$2,364,000 bond issue, and in April, 1932, work was completed on sewer improvements under a bond issue of \$984,000. No major construction work whatever was undertaken by the Salt River Valley Water Users' Association, which offers a striking contrast to the eight years of major development immediately preceding. During the seven calendar years ending with 1929 a total of \$100,000,000, an average of \$14,300,000 yearly, was expended on or in the immediate vicinity of the project for development construction by irrigation, power, telephone, and railroad organizations, city, county, and State, and in private building, not including mine, farm, and orchard development.

Bank deposits may be taken as another indication of the economic trend. Figures for the last four years are as follows for banks within the Salt River project:

Deposits:

June 30, 1932.....	\$18, 212, 000
June 30, 1931.....	33, 128, 000
June 30, 1930.....	35, 364, 000
June 30, 1929.....	42, 624, 000

In June, 1932, two banks, one having two outside branches, suspended operation.

The extremely low price of copper has resulted in the whole or partial shutting down of most of the copper mines in the State, which were large purchasers of farm products grown on the project. One of the principal markets for power served by the project hydroelectric system, consisting of mines at Miami, Inspiration, Superior, Ray, and Hayden, was thus to a large extent affected, although existing long-term contracts guarantee the water users' association large minimum payments, even though power is not actually used. The receipts from power sold to mines during the year amounted to \$607,623. The total power distributed by the system was 200,164,633 kilowatt-hours and the revenue \$2,000,714.

Engineering.—Ten consecutive years of almost unbroken subnormal run-off were terminated with the rains and snow of late 1931 and

early 1932, resulting in an addition of 1,075,000 acre-feet to the reservoir capacity between November 10, 1931, and May 1, 1932, at which latter date 1,425,000 acre-feet of water were in storage (590,000 acre-feet less than full capacity). During the year 1930-31 out of 695,000 acre-feet charged for at the farms 307,000 acre-feet was pumped water. Over 54,000,000 kilowatt-hours of electric energy valued at over \$500,000, was required to operate these pumps. The availability of most of this power from the eight project hydroelectric plants demonstrated, in this and preceding years, the value of the \$11,500,000 power-development program completed since 1922. The entire generating capacity of the power system prior to this additional development would have been 3,000,000 kilowatt-hours short of supplying the power needed for the purpose of pumping alone. During the last three years, owing to the low head in the reservoirs and the large amount of pumped water used, steam power was used by the association in addition to hydroelectric power to supply the demands on its system, as follows:

1930-31.....	\$778, 000
1929-30.....	927, 000
1928-29.....	1, 110, 000

With the present favorable water conditions, a considerable portion of this will be saved, and, in addition, a large steam load connected with the association lines will be available. It is anticipated that these two items should aggregate \$900,000, equivalent to \$3.70 an acre. This revenue will more than offset the loss resulting from the closing of copper mines heretofore absorbing a large part of the hydro-system output.

The power distribution system completed in 1930 now serves electricity to practically every farm on the project, and the first full year of operation substantially paid its own way and furnished domestic and farm power at a rate comparing very favorably with rates in large cities throughout the United States.

The value of the power system to the project has been fully proven, and it is believed that the high standing of the Salt River Valley Water Users' Association in the financial world to-day is largely due to the successful and conservative manner in which it has in the past 12 years financed and constructed, without aid of Government funds, a development of \$20,000,000 and also paid \$7,000,000 on the original \$10,000,000 debt to the United States.

YUMA PROJECT, ARIZONA-CALIFORNIA

Economic.—The general agricultural depression affected the project about as other parts of the country to the extent that the project lands are devoted to such crops as cotton and alfalfa. However, special

crops, such as pecans, citrus fruits, lettuce, cantaloupes, and winter vegetables were affected in a somewhat lesser degree.

At the beginning of the fiscal year only two of the original five project banks remained in business. One of these closed in September, 1931, and the other on April 15, 1932. This left the project without banking facilities until June, 1932, when a new bank opened in Yuma.

Continued low cotton prices caused a considerable reduction in the acreage planted to this crop. A preliminary survey made in April indicated an area for this year of only about 10,000 acres compared with 19,895 acres for 1931, 28,073 for 1930, and 36,029 for 1929.

Under the contract of February 5, 1931, the Yuma County Water Users' Association collects from individual water users all charges in the Valley division, containing 47,400 acres. On June 30, 1932, 40,917 acres, or 86.5 per cent of the land in this division, was listed as eligible for water service, having paid the first half of the operation and maintenance charge in advance. Under the circumstances this is considered a very gratifying showing.

There are two cooperative marketing organizations on the project. The Farmers' Cooperative Association operates cotton gins and markets cotton and cottonseed. The Yuma County Farm Bureau Marketing Association handles alfalfa hay and alfalfa seed principally. Both associations lost heavily in the local bank failures, and through the resulting inability to finance cotton growers the Farmers' Cooperative Association has been forced to practically suspend operations, the members, of necessity, contracting their cotton with the cotton finance corporations which were in a position to finance their growers. An attempt was being made to organize a rural credit union by which means the association hopes to resume financing next year. The Farm Bureau Marketing Association succeeded in obtaining funds through the intermediate credit bank and, as this association was the only agency financing alfalfa growers on the project, it increased its membership and expected to handle somewhat more than the 60 per cent of the local crop handled last year.

Yuma Mesa.—The general depression slowed the development of the Yuma Mesa to the extent that no new plantings were made this year. Earlier plantings reaching bearing age will, however, increase the yield for this year about 50 per cent over 1931. The prices received for fruit, although low, still return a fair margin over growing costs. The increasing age of the trees makes a marked improvement in the average quality of the fruit produced. The production of this better fruit will probably operate to lower the return from new groves, the fruit from which is graded down. Practically all the fruit grown is marketed through the Yuma Mesa Fruit Growers' Association and the Desert Fruit Exchange.

Engineering.—The annual maintenance work on Laguna Dam, consisting mainly in repairs to the talus, is lessening as the weaker places are filled with large stone. The construction of an extension to the main drain in the valley division to relieve an area affected by a high ground water table in the upper part of the division was practically completed at the end of the fiscal year. Additional drainage for this area will probably be necessary in the near future.

An increase in the annual river-front protection work was necessary this year owing to a steadily rising river bed as a result of a number of low-water years. Raising of a portion of the valley division levee system will probably be necessary before the next flood season. Cleaning of canals remains a large item of expense. In many instances additional right of way must be acquired for deposition of the spoil from cleaning.

BOULDER CANYON PROJECT, HOOVER DAM, ARIZONA-NEVADA

On June 30, 1932, construction work was approximately 25 per cent completed, the greater part of which was done during the fiscal year.

The principal preparatory construction completed under Government contracts comprised the building of a standard-gage railroad 10¼ miles in length from Boulder City to the rim of Black Canyon at the dam site, the construction of 7 miles of oil-surfaced macadam highway from Boulder City to a junction with the Black Canyon Highway at a point near the end of the railroad, and the transformation of Boulder City from a desert waste to a modern town with a population of 5,000.

Six Companies Inc., contractor for Hoover Dam, power plant, and appurtenant works, increased the number of its employees during the year from 1,250 to more than 3,400, installed up-to-date types of construction machinery, many of their own origination, and vigorously accelerated progress on all construction activities.

The contractor built nearly 20 miles of standard gage railroad, connecting, in one link, the Arizona deposit of concrete aggregates, a 500-ton-per-hour screening plant in Hemenway Wash, a concrete mixing plant of 275 cubic yards per hour theoretical capacity, and a line to the railroad built by the Government from Boulder City. Important features of this system are a pile trestle bridge 850 feet long across the Colorado River near the Arizona deposit, and side tracks to sites for storage of unfinished and of screened concrete aggregates.

In Black Canyon the four diversion tunnels for Hoover Dam were excavated, with the principal exception of ramps at the outlet ends, to the full 56-foot average diameter for their total combined length of 15,905 feet. Excavation of solid rock in driving these tunnels amounted to approximately 1,500,000 cubic yards. In January,

1932, top headings, consisting of the upper 41 feet of the 56-foot diameter bore, were driven from eight faces. Excavation for that month amounted to 6,845 linear feet and 455,380 cubic yards. The best day's record was the driving of 256 linear feet of the 41 by 56 foot headings, requiring the removal of approximately 17,000 cubic yards of rock.

Other excavation in progress during the year, under the contract with Six Companies Inc., was for the Nevada and Arizona spillway open cuts, the Nevada intake towers, the pioneer bores in the inclined tunnels to the spillways and intake towers, and the cuts and fills on the Black Canyon Highway.

Concreting began on March 5, 1932. Lining the diversion tunnels to a 50-foot inside diameter section was started on March 16, 1932, and at the end of the fiscal year approximately 6,000 linear feet of invert, 4,000 feet of side walls, and 300 feet of arch section had been poured. Concrete placed for Government construction amounted to approximately 60,000 cubic yards.

At the beginning of the fiscal year Boulder City was little more than a construction camp with few improvements. By the end of the year it had grown into a thriving community, with paved streets, concrete curbs and sidewalks, ornamental street lighting, town-site parking, and landscaping. An adequate supply of clear, pure water had been provided and a modern sanitary sewer system had been built. Water is pumped from the Colorado River through 6 miles of pipe and against a static head of over 2,000 feet to a 2,000,000-gallon storage tank in Boulder City. En route it passes through clarification, filtration, and purification works. The sewage disposal plant, of a sludge digestion type, has been operating efficiently since its completion on February 12, 1932.

At the end of the fiscal year more than 850 buildings were within the town-site boundaries, of which the Government had built 84, Six Companies 681, and permittees approximately 100. The Government had erected two substantial public buildings for offices of the administrative and engineering personnel of the project and Boulder City. Seventy residences and a 36-room dormitory had been built for Government employees, and an 8-room school, a 30-room dormitory, and 30 dwellings were under construction at the end of the fiscal year.

Six Companies Inc. completed its principal building program in Boulder City during April, 1932. These buildings comprised 661 residences, 10 dormitories of 1,500 persons total capacity, a completely equipped commissary, a mess hall seating 1,300 persons, two office buildings, a machine shop, garages, and miscellaneous structures.

Government permittees had erected approximately 70 buildings to house 48 different types of business enterprises. These included a

moving-picture theater, a group of industrial cottages, restaurants, drug stores, garages, service stations, tourist camps, bus depot, and general stores. Two churches, an American Legion Hall, and a Masonic Temple had also been constructed.

DENVER OFFICE ACTIVITIES

BOULDER CANYON PROJECT

Owing to the early issuance of the specifications for the construction of Hoover Dam, power plant, and appurtenant works in order to assist in relieving unemployment conditions, many of the designs were preliminary in nature and contained only sufficient detail for contract purposes. As many features of the design are without precedent in engineering practice, exhaustive study, research, and experimental work, much of which was of a pioneering nature, were carried on to determine the essential data required for safe and economic design and construction. As soon as the results of the aerial and ground photographic surveys of the topography of the site of the work were available, detail studies of the topography and geology were made to determine the final location of the diversion tunnels and spillway structures. Final detail designs were then begun for the various structures, the work being undertaken in the order of its requirement in the construction program and including the highways at each end of the dam, the inlet and outlet structures to the diversion tunnels, the spillway tunnel plugs, the spillway structures, and the spillway and penstock tunnels. Several major changes were made in the designs, including the change from concrete bulkheads for the outer diversion tunnels to steel bulkhead gates with hydraulic cylinder hoists, change in size of the Stoney gates at the outlet ends of the inner diversion tunnels, changes in location and general design of the spillways, a change from the inclined freight elevator on the wall of the canyon to a permanent cableway of 150 tons capacity, and the decision to install plate-steel pipes in the penstock and outlet tunnels. Designs for the bulkhead and Stoney gates and hoists were completed, specifications were issued on April 9, 1932, and contracts awarded covering the purchase of the gates and hoists. Specifications were issued on April 12, 1932, for furnishing and installing the plate-steel outlet pipes. Bids were requested on three alternative plans for the outlet pipe system, resulting in the adoption of the system involving 30-foot diameter pipes. The designs of the tunnels and penstocks were revised to conform to the requirements of this system. Work was in progress on details of design of various other features of the work.

Technical investigations carried on during the past year covered many special problems encountered in the detail design of Hoover Dam, including verification of the theory of the trial load method of

design by the correlation of theory with actual physical measurements on models of the Hoover and Gibson Dams; the development of methods and solution of the problem of nonlinear stress distribution in arch and cantilever elements; investigation of the efficiency of fillets in stress reduction; theoretical investigation of spreading of the canyon walls due to water pressure in the reservoir and the thrust from the dam; studies of stress conditions in the rock around the tunnels; and development of theory of penstock design in conjunction with laboratory tests. Model tests of various types of spillways and modifications of types were completed at the hydraulic laboratory of the Colorado Agricultural College at Fort Collins, Colo., and on the South Canal on the Uncompahgre project, Colorado, and the results of the tests incorporated in the design of the spillways. Extensive experiments were also carried on at Fort Collins on the hydraulic losses in the plate-steel penstocks for the Hoover power plant. Final or preliminary reports of the technical investigations and experimental work were prepared and made available to consulting boards and for design purposes.

An extensive program of mass concrete and cement investigations and tests was initiated and in progress at two laboratories established in Denver, at the laboratory of the University of California at Berkeley, Calif., and at the Owyhee and Gibson Dams. The program of research outlined at the joint meeting of the Hoover Dam Consulting and Concrete Research boards held in April, 1931, necessitated the development of special apparatus in the Denver laboratories. The laboratory in the basement of the customhouse was engaged on comprehensive series of tests of compressive strength, elasticity, permeability, bond, and sliding friction and other factors incidental to the satisfactory completion of the main program. The laboratory established in rented quarters was engaged on tests to determine thermal conductivity, thermal diffusivity, specific heat, density, and heat rise of mass concrete and also other tests on volume change and plastic flow. Joint grouting experiments have yielded data of exceptional value in connection with the successful grouting of field contraction joints.

The bureau, in cooperation with the University of California at Berkeley, Calif., has initiated an elaborate series of tests to develop the most suitable cement for use in the construction of Hoover Dam. The major part of this investigation will be completed by the engineering materials testing laboratory of the university in the fall of 1932. Mass concrete investigations included large-scale field tests at Owyhee Dam to determine the efficiency of the pipe cooling system in removing setting heat, and tests to obtain data on volume change and the corresponding contraction joint opening under actual field conditions. A series of experiments to establish the effects of high-

velocity water jets on concrete was carried out at Guernsey Dam at the request of the Colorado River Board.

The Colorado River Board met from October 21 to November 6, 1931, to consider problems in connection with the design of the Hoover Dam. The board inspected the construction in progress at Owyhee Dam and at Hoover Dam and observed tests of spillway models at Fort Collins, Colo., and at Montrose, Colo., and of a model of Hoover Dam at Boulder, Colo. The board approved the general type of spillway which had been designed on the basis of results of the technical and experimental research work, recommended that plate-steel pipes be installed in the pressure tunnels, and that research be continued into the aggregates and various methods of mixing and placing concrete in the structures.

Work was in progress at the close of the fiscal year on the designs for the Hoover power plant, and a preliminary draft of specifications covering the initial group of hydraulic turbines and governors was prepared and submitted to the various turbine manufacturers, and also to the bureau of power and light of the city of Los Angeles, the Metropolitan Water District of Southern California, and the Southern California Edison Co. for review and comment. Conferences were held with representatives of all of the major turbine manufacturers in regard to the specifications for the turbines, governors, and butterfly valves.

Designs and specifications were prepared for the construction of Boulder City, including an administration building, municipal building, garage for the fire department and for Government automobiles, water purification plant, sewage disposal plant, school building, permanent dormitory, temporary dormitory, and 100 residences and 3 community garages for the use of Government employees.

All construction work was done by contract, and specifications were issued from time to time as plans of the several buildings or groups of buildings were completed. The contracts provided that practically all materials would be furnished by the Government, and bills of material were prepared and the materials purchased by the Denver office.

ALL-AMERICAN CANAL

Additional foundation investigations were made at Imperial dam site in November and December, 1931, consisting of eight test pits and 5 wash borings. Further tests were made to determine the efficiency of the desilting works at Laguna Dam in connection with the design of desilting works at Imperial Dam.

A form of contract between the United States and the Imperial Irrigation District was prepared, providing for construction of the All-American Canal and repayment of the cost thereof by the district

under the reclamation law. The limit of expenditure by the United States is set at \$38,500,000.

The form of contract was approved by the Secretary of the Interior on November 4, 1931, and later by the directors of the Imperial Irrigation District, by the State Engineer of California, and the California Districts Securities Commission. Execution of the contract was authorized by the electors of the Imperial Irrigation District at an election held on February 11, 1932, the vote being about 5 to 1, and the contract was executed by the officials of the district on March 1, 1932. It will not be effective until the district boundaries are changed to include substantially all the lands which can economically be served with water for irrigation from the All-American Canal. Opposition developed among some of the land owners of the Coachella Valley against inclusion of their lands in the Imperial district as required by the contract, and request was made that a separate contract be entered into with the Coachella district.

ORLAND PROJECT, CALIFORNIA

Economic.—Low prices for farm products combined with relief legislation pending in Congress resulted in a curtailment of collections during 1931. Collections were about \$70,000 less than the accruals, so that at the close of the year unpaid reclamation charges were 13½ per cent of the accruals for the years in which there are delinquencies. Crop production was uniformly high, a number of the major crops producing larger yields than for a number of years. Owing to the general lower price scale, however, the crop return for 1931 was only about two-thirds of the average.

Although two less farms were under operation and about 200 acres less land irrigated, the farming population increased 126 during the year. The number of tenant-operated farms increased 22, and at the close of the year represented 22 per cent of the total farms on the project. Bank deposits declined about \$111,000 for the year.

Project dairy herds were the largest in the history of the industry, but on account of depressed prices for butterfat, values were at correspondingly low levels. Butter production of the two local creameries, although declining somewhat, amounted to nearly one and one-half million pounds for the year. Almond production exceeded any prior season; returns, however, were only 60 per cent of those for 1930. Prices received for oranges were only about one-half the mean and less than the previous minimum. Oranges, almonds, olives, apricots, prunes, and turkeys were marketed through the medium of local cooperatives, most of which are affiliated with State organizations.

Engineering.—The policy was continued of placing concrete lining at locations on the distribution system subject to heavy transit losses and maintenance costs; 0.4 mile of laterals was lined, on which

2,780 square yards of lining were placed. The timber headgates of the North Canal were replaced with a concrete structure.

GRAND VALLEY PROJECT, COLORADO

Economic.—There were 460 farms irrigated during the 1931 season. Yields were normal and sufficient irrigation water was available for all needs, but prices were low. The average water user is, however, adapting himself to conditions, and the cost of production of the 1932 crop will probably be much less than heretofore.

The beet-sugar factory at Delta, Colo., handled all beets grown on the project and the Grand Junction factory remained idle. The Colorado Potato Growers' Association was the principal marketing organization for potatoes and operated successfully during the year. The Colorado Poultry Association and the Bean Growers' Association functioned well throughout the year.

As a result of the low crop returns new improvements, both farm and city, were at a standstill. Crop financing was difficult to obtain, but nearly all water users managed to put in a crop for 1932 and prospects were good for a normal yield. Despite the general low returns from all crops, delinquencies in payment of project water charges were reasonably small.

Engineering.—During the year a contract was entered into between the United States, the Grand Valley Water Users' Association, and the Public Service Co. of Colorado for the construction of a 3,000-kilowatt power plant at an estimated cost of \$215,000 and for the sale of all surplus energy. The Public Service Co. is to advance all funds for construction and is to pay a yearly water rental of at least \$15,000 for a period of 25 years. The construction of this plant was contracted and work was well under way at the close of the fiscal year.

UNCOMPAHGRE PROJECT, COLORADO

Economic.—During the 1931 irrigation season 1,710 farms were irrigated, 925 of which were farmed by owners and 785 by tenants.

The average crop value per acre was \$22.19, due primarily to the low prices received for agricultural products. It was also partly due to decreased yields caused by shortage of water during the irrigation season. Alfalfa and onions showed a higher unit value than for the previous year and sugar beets and wheat an increase in yield.

With the exception of the transfer by purchase of a number of farms, settlement was at a standstill. One farm unit was filed upon during the fiscal year.

The beet-sugar factory at Delta, Colo., handled all beets raised on the project and also sliced the 1931 crop raised in the vicinity of the

Grand Junction factory. The Colorado Potato Growers Association is the principal marketing association and handled potatoes and onions chiefly. Three cooperative poultry associations operated on the western slope of Colorado, one of which handled turkeys exclusively and the other two turkeys, other poultry and eggs. An association for the grading and marketing of hogs was continued and did a good business. The cooperative oil, gasoline, and service stations located at Montrose and Delta were doing a thriving business.

Pursuant to the provisions of the act of January 31, 1931, a contract was executed under date of August 4, 1931, between the United States and the Uncompahgre Valley Water Users Association, under the terms of which the association assumed control of the operation and maintenance of the project on January 1, 1932.

Engineering.—A considerable area of the project is seeped and the productivity of other lands impaired. Among other things, the act of January 31, 1931, and the contract of August 4, 1931, provided a method whereby drainage might be completed during the years 1932 to 1937, inclusive, the funds for drainage being obtained from the annual construction charges commencing with the charge due December 1, 1931. The funds so expended for drainage would then be carried in the project supplemental construction account and repaid at a later date.

BOISE PROJECT, IDAHO

Economic.—Project farmers were handicapped by low prices for commodities and by a subnormal water supply in 1931, as a result of which many of the older alfalfa fields had to be reseeded. Hay was an exception to the general surplus, there being a shortage of feed with corresponding high prices.

Demand for farms to rent was fair but sales were negligible.

Cooperative marketing organizations were active.

Farm credit was a problem owing to diminishing returns and might have become even more serious had it not been for Federal relief measures.

Engineering.—No construction work was in progress during the last fiscal year. The reserved works, including Arrowrock, Deadwood, and Black Canyon dams and reservoirs, the diversion dam, and Black Canyon and Boise power plants were operated and maintained by Government forces. The distribution systems on the Arrowrock and Notus divisions were operated by the water users through the board of control. Investigations have been carried on to determine the possibility of securing an additional water supply for the project lands.

KING HILL PROJECT, IDAHO

Economic.—Of the 189 irrigated farms 126 were operated in 1932 by owners and 63 by tenants. About 125 acres were being farmed this year that were idle part of the time in the past, and there has been a strong demand for farms to rent. Considerable acreage was planted to early potatoes and a small quantity had been sold at low prices. Grain was being harvested at the close of the fiscal year. The demand was limited and prices were low. Considerable corn was planted and not so many beans as last year. The financial condition of the farmers was poor. A number applied for and obtained loans from the Government for seed and part of their water payments; others gave the district crop mortgages for water payments. It was difficult to obtain any financial assistance locally.

Engineering.—Nine hundred linear feet of new concrete lining was placed in the Main Canal where seepage loss was great, and about 2,000 yards of backfill was made along the head-end flume. Considerable repairing was done to pipe lines and concrete flumes and linings. Water service was successfully handled during the year without any serious breaks. However, a cloudburst on June 15 and again on July 12 and 13 filled the concrete flume with a large quantity of earth, gravel, and rock which necessitated turning out the water to clear away the débris in the flume. Considerable repairing was also being done to the different structures of the canal system.

MINIDOKA PROJECT, IDAHO

Economic.—The number of irrigated farms was 2,285 compared with 2,270 in 1931. Of the irrigated farms, 1,450 were in the gravity division and 835 in the pumping division. Sixty per cent of the farms were operated by owners and 40 per cent by tenants. The demand for farm property was light, and only a few sales were made. Prices were moderate.

Crop yields in 1931 were fair but prices were low. Potatoes were seriously damaged by the sprouting of the tubers in the ground when about half mature, resulting in a reduction both in quality and yield. The scarcity of alfalfa hay in the spring of 1931 brought about a marked temporary advance in price, but the available supply was too small to have any sustained effect on the market.

Water supply.—There was a heavy snowfall over the Snake River drainage area last winter. That on the Jackson Lake Reservoir area, which is usually taken as the criterion for the entire valley, has been exceeded only twice since records were begun in 1919. Owing, however, to the cold, late spring in 1932, which resulted in a slow run-off, a large part of the water was absorbed in the ground, and American Falls Reservoir failed to fill. There was also some uncertainty at the

end of the fiscal year as to Jackson Lake, although there was good prospect that it would reach its capacity early in July. The total storage on June 30 was 758,740 acre-feet out of a capacity of 847,000 acre-feet. At American Falls the maximum amount impounded up to June 30 was 1,277,160 acre-feet, or 75 per cent of its capacity. The normal flow of Snake River was sufficient to supply all irrigation needs prior to that date except for about a week during the latter part of May and early in June. It was expected that the normal flow would be well maintained through the season and that there would be a substantial hold over in both reservoirs this winter.

The new Milner-Gooding Canal was in service throughout the entire season, and water was delivered through it to the old North Gooding Canal in May, 1932. More than 266,000 acre-feet were diverted for use on Gooding lands or for puddling during the year ending June 30, 1932.

Repairs to Jackson Lake Dam, which have been in progress for the past three years, were nearly completed. There remained to be done only a portion of the rubble coping wall along the front of the embankment and a small amount of rock fill on the lower side of the embankment. Good progress was also made in clearing timber around the reservoir.

Engineering.—Enlargement of the South Side distribution system and widening of the Main South Side Canal were continued throughout the year whenever conditions permitted. A new transformer station, containing 3 units of 1,333 kilovolt-amperes each, with a fourth unit held for emergency, was erected at the first lift to take care of the increased pumping load. A siphon spillway was built on the Main South Side Canal at the head of the Gravity Waste Canal to replace an old concrete structure that had long been in a weakened condition.

On the Gooding division construction of the Milner-Gooding Canal and enlargement of the North Gooding Canal were completed. The construction of laterals to be supplied by these canals was begun by Government forces. A contract was awarded for building the appurtenant structures.

BITTER ROOT PROJECT, MONTANA

The act of Congress approved July 3, 1930, authorized an appropriation of \$750,000,* of which \$500,000 was for the liquidation of the bonded and other outstanding indebtedness of the Bitter Root Irrigation District, on the basis of not to exceed 75 per cent of the principal and accrued interest. Approximately \$498,000 was expended to purchase the outstanding bonds and warrants and \$250,000 of the amount authorized is to be used in the rehabilitation of the canal system. The money loaned by the United States is to be repaid by the district over a period of 40 years, with interest at 4 per cent.

This project was constructed by private capital and has reached a high state of settlement and development but, because of the slump in agricultural prices, about 20 per cent of the irrigable area had passed into the hands of the district through tax sales, leaving a financial burden which was too heavy for the remaining lands to carry. Increased annual assessments per acre did not bring in the funds required to operate and maintain the canal system and pay principal and interest on the bonded indebtedness. A well-developed agricultural community was threatened with serious loss and it was for the purpose of saving a large number of homes that assistance was extended by the United States.

Economic.—The Bitter Root irrigation project has an irrigable area of about 20,000 acres. In 1931 there were 221 farms with 15,296 acres of land cropped and irrigated. The basic agriculture centers around stock feeding and dairying, with apples, sugar beets, peas, and garden truck as the principal cash crops. For several years prior to 1931 gross crop values had averaged about \$40 per acre, but reduced prices of agricultural products brought this value down to \$18.50 for that year. Because of favorable climatic conditions this project produces an excellent quality of McIntosh Red apples, the sale of which, under normal conditions, furnishes a very important part of the revenue received on the farms.

As a result of the loan advanced by the United States there has been an increased demand for farms, which indicates that the 4,500 acres of land now held by the district will be sold and brought into production.

Engineering.—In the original construction of the main canal, which is 72.8 miles long, there were about 10 miles of wooden flumes ranging in size from 14 to 20 feet wide and 5 to 7 feet deep. As these wooden flumes reached the end of their safe use, they were, in most cases, replaced by earth sections and prior to 1931 about half of the old flumes had been so replaced. The irrigation district was confronted with the necessity of continuing this replacement work, which it was intended to carry on over a period of about five years. It was estimated that about one-third of the total amount loaned by the United States to the district would have to be used for this purpose. Present plans contemplate replacing all but about a total of 1 mile of wooden flume with earth sections. There are a number of places where the canal crosses drainage channels where flumes will have to be used. The replacement program is being carried on by the local management, in accordance with plans and specifications approved by the chief engineer of the Bureau of Reclamation.

HUNTLEY PROJECT, MONTANA

Economic.—Good farms were all occupied, there being a brisk demand by renters for available places. Few farms changed ownership except as a result of foreclosure. During the year 638 farms were under cultivation, of which 349 were operated by owners and 289 by renters.

In general, banks refused to make loans to finance the growing of crops, the main reason being that the sugar-beet contract did not specify a minimum price for beets, which are the project's principal money crop. Furthermore, the low price of other farm products did not provide very good security.

Sugar beets still remained the principal crop regardless of the unfavorable contract. A large amount of the 1931 bean crop was still in storage as the average price throughout the season was less than \$1 per hundredweight. The condition of all crops was good and yields will probably be above the average. However, unless prices improve, the farmer will be fortunate if he receives for the entire crop the amount of money necessarily expended to produce the crop. There has been no shortage of water during the irrigation season, nor is any anticipated.

Most of the beet growers are members of the Beet Growers Association. The Bean Growers Association is inactive this year because the acreage in that particular crop is very small. Most of the lambs and wool grown on the project are marketed through the Wool Growers Association. The most active organization for the promotion of things in general on the project is the Huntley Project Development Association.

The records of the rating station at Billings, which is above the Huntley diversion, show that from a discharge of 25,700 second-feet on June 4, 1931, the river receded with almost a uniform daily drop to September 14, when 1,780 second-feet were recorded, which is the lowest on record.

The average duty of water for the past 20 years has been 1.38 acre-feet per acre irrigated, but during the season of 1931 it required 3 acre-feet.

Engineering.—During the latter part of July, 1931, a low-water diversion dam was constructed across the main channel of the Yellowstone River at a point 1,000 feet below the headgates. The material used in the construction of the dam was steel wire cable, steel rails, concrete, willows, rock, and gravel. The dam is inexpensive, and has served the purpose well.

During the year 2.16 miles of deep open drain were constructed. Tile drain No. 6 was cut into open drain No. 10-2 at a point 1½ miles above the outlet. This drain has been overloaded during the irriga-

tion season for the past several years. The results of this relief appeared to be very good at the close of the fiscal year.

MILK RIVER PROJECT, MONTANA

Economic.—The subnormal rainfall of 1930 continued through 1931 with the lowest annual precipitation since 1910, a condition which stimulated the development of project agriculture. Dry-land crops were a complete failure resulting in an increased demand for project farms by farmers from the adjacent bench lands. The colonization program inaugurated during 1930 was continued through 1931, and 15 new settlers, principally experienced farmers, were located on the Malta division during the year. These new settlers, as a rule, had no resources, owing to the three years' failure in dry-farm crops, and local credit was not available for farm development purposes, yet noticeable improvements have been made by them during the past two years. As a rule excellent terms are given in purchase contracts and in many instances the property owners have assisted materially in the farm development program.

Although an excessive early spring demand for water created a temporary shortage which resulted in some damage, good crops generally were produced from the 493 farms actually irrigated. Owing to the comparatively large area in sugar beets and the good prices prevailing locally for feed crops, the crop revenue was only slightly less than that of the preceding two years despite the generally low price level for all farm produce.

General improvement continued in agricultural practices, particularly in irrigation methods. Water was used more generally and with better results during 1931 than in any previous irrigation season. Practically all farmers, except those producing native hay, have adopted modern methods of irrigation with beneficial results.

Although a large number of the dry-land farmers adjacent to the project were dependent almost entirely upon Red Cross aid during the winter of 1931, practically no assistance was necessary to project farmers.

The average yield of sugar beets was slightly less than that of 1930, but the total tonnage harvested and the amount of sugar manufactured exceeded those of any previous year in the history of the industry on the project. Production contracts with the sugar company for 1932 provide that one-half of the gross sugar sales will be returned to the grower in payment for beets produced. Although this forecast a considerable reduction in the price paid for beets, it did not discourage the growers, and approximately 7,000 acres were contracted for the season, or an increase of about 35 per cent. The season was favorable and an excellent crop was in prospect.

Engineering.—Repair and improvement of the St. Mary Canal were continued, consisting of slide removal, strengthening of the lower bank through slide sections, repair of canal bank to reduce seepage losses, and the replacement of the substructure of Spider Coulee flume. The removal of slides and bank strengthening were approximately 85 per cent complete at the close of the fiscal year, and the work remaining to be done will not interfere materially with the carrying capacity of the canal. The repair of Spider Coulee flume was completed and this structure is in excellent condition. The canal was being operated to 86 per cent of its designed capacity at the head during 1932, and it is probable that the entire diversion capacity could be utilized if necessary. Bank reconstruction through the upper 5 miles of the canal resulted in some reduction of seepage losses, but considerable work remains to be done before this loss can be reduced to a reasonable quantity. Losses still amount to about 11 per cent of the quantity diverted, and their reduction is the only means remaining of improving the project water supply since other repairs have placed the canal in condition to carry practically its entire designed capacity.

Work on the replacement of timber structures with concrete was continued on the Malta and Glasgow divisions. Sixty-six new structures were built which replaced 87 deteriorated timber turnouts and checks.

SUN RIVER PROJECT, MONTANA

Economic.—The program encouraged on the project in the past three years has been to change a portion of the large wheat and grain acreage to alfalfa, sweetclover, and potatoes, with a view to permanently building up the soil so that cultivated crops such as sugar beets, beans, etc., can be raised profitably. The trend is shown conclusively by the fact that in 1929 the project had 4,893 acres in alfalfa, 1,146 acres in sweetclover, and 43 acres in potatoes, whereas in 1932 there were 8,000 acres in alfalfa, 2,900 acres in sweetclover, and 400 acres in potatoes.

Three hundred acres of seed peas were contracted in 1931 and the average yield was 23 bushels per acre with a maximum yield of 40 bushels. No peas were contracted for 1932 as the seed houses had a surplus on hand. The average gross return from seed peas in 1931 was \$30 per acre. This crop will undoubtedly assume an important place in the crop-rotation program when economic conditions improve. In 1932 several experimental fields of corn were planted for feed and it is hoped that the growing of this crop will be successfully developed.

There is an additional area of about 20,000 acres in the Greenfields division and 7,900 acres in the Mill Coulee division that can be brought under irrigation by the construction of the necessary lateral system.

Much of this area is public land withdrawn from entry. Landowners in the Vaughn division are much interested in getting water on their lands also. These lands as well as the Mill Coulee and East Greenfields area are well located and logically should be developed at an early date in order to made full use of the large investment which the United States has in main canals and storage works.

The morale of the settlers is good considering the low price of all farm products. They do not have much money, but feel that they are as well off on the Sun River project as elsewhere.

Engineering.—The Fort Shaw division of this project was successfully operated by the officials of the Fort Shaw Irrigation District. The Greenfields and Big Coulee divisions, as well as Gibson Dam and Reservoir, were operated in an equally satisfactory manner by the officials of the Greenfields Irrigation District.

A limited amount of silting work was done on the Pishkun and Spring Valley canals. This work was discontinued on June 30, 1932, as no appropriation was available after that date. The tightness of all the main canals can be materially improved by silting operations as the waters from Gibson and Pishkun Reservoirs are abnormally clear and free from silt. Structures and laterals to lands under public notice were completed early in the fiscal year. During the year an investigation of and report on seepage conditions in the Greenfields division were made. As a result a contract for the construction of 12 miles of open drain was entered into on June 23, 1932. At the close of the fiscal year a drag-line excavator had been shipped to the project and a force was being organized to do this work. With the increased use of irrigation water additional drainage work will be required, probably in the near future.

LOWER YELLOWSTONE PROJECT, MONTANA-NORTH DAKOTA

Economic.—There were 514 irrigated farms on the project in 1931. In addition, 28 farms were wholly dry farmed but with practically no returns. The area under irrigation was 31,242 acres, which exceeds the maximum heretofore irrigated by 2,500 acres. During the current year 54.7 per cent of the irrigated farms were operated by owners or managers compared with 47 per cent the previous year. The results of drainage work were highly satisfactory and good crops were being raised on land that had been badly seeped.

Settlement work throughout the year was practically at a standstill owing to the depressed agricultural conditions. Some follow-up work was done by the Lower Yellowstone Development Association and there were indications that several new prospects would select farms on the project at an early date. The irrigation districts succeeded in getting buyers for all except three of the farms taken over for non-payment of taxes, but nearly all of these were sold with little or no

down payment. The demand for farms to rent greatly exceeded the supply of those having suitable buildings.

The factory of the Holly Sugar Corporation at Sidney handled 10,000 acres of beets grown on the project. A flour mill was operated at Sidney throughout the year and one at Fairview intermittently. A modern creamery at Sidney specialized in the manufacture of butter and ice cream. A seed cleaning and distributing plant at the same point handled large quantities of alfalfa, clover, grass, and other seeds. A Sidney firm conducted a livestock market at which any quantity from one head to a carload would be bought at any time the farmer chose to sell.

The financial record of the districts was very satisfactory considering the low prices received for farm products. District No. 1 had paid all charges accruing before the effective date of the moratorium act and made a substantial payment on the charges which were later deferred. District No. 2 was \$6,205.57 in arrears on the charges for 1932. Each district raised sufficient money to keep the operation and maintenance work on a cash basis.

More settlers are needed. Some method of getting the marginal lands and those which are not meeting their assessments into a paying status is urgent to relieve the extra burden imposed on the lands that do pay. Legislation permitting more flexibility in the classification of lands particularly for temporary suspensions pending sale or settlement would be a great relief. Requirements of the Federal land bank should be revised to make loans possible on project lands.

Engineering.—Water in the Yellowstone River reached an unprecedented low stage in July and August, 1931, and although there was ample water in the river for project use, the accumulation of silt in the first 3 miles of main canal prevented filling the canal to full capacity with the available water elevation. Sand bags were accordingly placed on the crest of the dam and the water raised sufficiently to fill the canal. Unusual drought conditions greatly increased the demand for water. Silt was removed from both the main canal and lateral system.

NORTH PLATTE PROJECT, NEBRASKA-WYOMING

Economic.—For the first time in the history of the North Platte project a shortage of water for irrigation was experienced during the latter part of the 1931 season. The run-off of the North Platte River watershed above Pathfinder Reservoir was only 50 per cent of the mean of the previous 35 years and was the lowest of record. Pathfinder Reservoir was empty by the end of August. The available water supply was allotted to the project irrigation districts according to irrigated acreage and to Warren Act contractors according to storage rights.

The water shortage was not severe enough to affect yields generally, except for alfalfa hay. The beet crop matured without material reduction of tonnage due to water shortage. Crop yields of hay and grain were slightly below normal, but the yield of sugar beets and potatoes was above normal. Low prices received for all products resulted in a material reduction in the per acre value of crops. The area cropped in 1931 was slightly less than for the previous year. About 2,500 acres of irrigable land were sold for water charges.

Collections by the irrigation districts of operation and maintenance charges for the 1932 season are reported to be satisfactory, and all of the districts are in good financial condition except the Northport. This district is in financial difficulty owing to delinquent payments and outstanding current indebtedness.

Construction charges due the United States for the fiscal year amounted to \$245,200 and credits from the sale of electrical power amounted to \$171,700. All of the districts except the Goshen had made application for the benefits of the relief act at the end of the fiscal year.

Sheep and cattle feeding was carried out on about the usual scale, with 8,500 head of cattle and 162,000 head of sheep reported in feed lots.

Engineering.—The reserved works comprising Pathfinder Reservoir, Guernsey Reservoir, Whalen diversion dam, and the power system were operated and maintained by the United States. The project canals, distribution systems, and drainage systems were operated and maintained by the four irrigation districts. About \$50,000 was expended by the Goshen and the Gering-Fort Laramie districts for construction of additional drains, and the Pathfinder district continued its program of main canal improvement.

Advantage was taken of the emptying of Pathfinder Reservoir to carry out repairs and improvements to the south side outlet valves at Pathfinder Dam. This work was completed in November at a cost of approximately \$12,000.

NEWLANDS PROJECT, NEVADA

Economic.—The extreme shortage of water which existed during the calendar year 1931, coupled with low prices of farm products and decreased yields, created an economic situation unparalleled in the history of the project. Lahontan Reservoir storage was practically exhausted on July 24 and no water was available for the irrigation of Truckee Canal bench lands between the first part of June and the latter part of October. The resulting financial effect of these conditions was somewhat relieved by the suspension of Government charges against water users' lands, permitted under the moratorium

act of April 1, 1932. Lahontan Reservoir storage, amounting on June 30, 1932, to 227,195 acre-feet, gave assurance of an ample water supply for Carson division lands during the 1932 irrigation season, but at the close of the fiscal year indications were that Truckee Canal lands would again suffer a shortage unless water stored in private reservoirs upstream could be purchased or pumping could be undertaken from Lahontan Reservoir into the Truckee Canal.

The irrigated area on farms totaled 42,672 acres, in addition to which about 7,209 acres in outside community pastures received some regulatory and drainage waters. Farms operated by owners numbered 563 and by tenants 179. One new water-right application for 23 acres was approved.

Of the bonds which had been issued for construction of rural electrical lines in nine local improvement districts, \$27,200 were matured at the end of the fiscal year. No new local improvement districts were formed during the fiscal year. District tax-roll assessments for the calendar year 1931 amounted to \$123,222, of which 90 per cent was collected to June 30, 1932, with an anticipated final delinquency on these assessments of about 7 per cent only. Operation and maintenance accruals for the calendar year 1932 (payable in advance of the delivery of water) amounted to \$67,475, of which 97 per cent was collected to June 30. The employment of water users for the performance of operation and maintenance and other project work was followed to the greatest possible extent by the project management to enable them to meet their payments. Little or no credit was available in most cases. The favorable showing in regard to payments of charges, above mentioned, was brought about largely by the deferment of Government charges through the passage by Congress of the moratorium act.

The value of crops harvested in 1931 was 25 per cent less than the values in 1930, when prices were so low as to bring financial distress to many farmers.

Effective September 1 salaries of employees of the irrigation district were reduced 10 per cent, and subsequent changes on June 15, 1932, resulted in reductions averaging about 20 per cent of salary rates in effect at the beginning of the fiscal year.

Engineering.—In addition to the regular operation and maintenance work on the project, every effort was made to increase the available water supply in 1931 by pumping from drainage and other sources where some additional water could be developed. Owing to failure of Nevada and California interests to reach an agreement as to terms and conditions, plans to pump water from Lake Tahoe for the irrigation of lands served from the Truckee River around Reno and

on the Newlands project, and to maintain sanitary conditions along that stream, were abandoned during July, 1931, following which it became necessary for the district to pump water from wells into the Fernley stock water pipe lines to serve stock and domestic water to the town of Fernley and farms. Negotiations were in progress at the close of the fiscal year to purchase waters stored in Donner and Independence Lakes to prevent loss of crops on lands under the Truckee Canal during the 1932 season. The prorating of the limited available water supply between water users lands under the Lahontan Reservoir required constant and careful attention.

The drainage system was extended 3.57 miles; improvements were made to the Carson Lake community pasture; various canal structures repaired; 228 linear feet of concrete lining placed in laterals across drains, and 23 tons of hydrous-aluminum silicate placed in one of the canals to prevent seepage losses.

A single-phase power line about 9 miles long was constructed to serve local improvement district No. 12, and other additions to the power system made by taking over lines that had been constructed by private parties.

Owing to the water shortage, the Lahontan power plant was idle from July 20, 1931, to February 1, 1932, except for a short interval in December and January. The plant was operated on a part-time basis after February 1.

Surveys and estimates were made on a small reservoir of about 3,400 acre-feet capacity located about 2 miles northeast of Fallon, but construction deferred owing to unfavorable economic conditions. Investigations were also made to determine the feasibility of the construction of about 5 miles of canal to deliver water from Lahontan Reservoir to lands on the Swingle Bench, but no work was undertaken.

Negotiations were carried on between the local district, the Washoe County water conservation district, representing interests around Reno, and the Sierra Pacific Power Co. in an effort to agree upon a stipulation as the basis for a final decree in the Truckee River water right suit and for the development of storage on that stream.

Considerable testimony was heard before a special master relative to Newlands project water right claims in the Carson River water right suit, but testimony regarding claim of interests in the upper Carson Valley remained to be heard. Plane table surveys were made by the district covering 12 privately owned reservoirs in Carson River watershed to collect information useful in this suit.

The early settlement of water-right litigation matters and the development of an adequate water supply for Truckee Canal lands are urgently needed.

CARLSBAD PROJECT, NEW MEXICO

Economic.—There were 500 farms cultivated during 1931, of which 213 were operated by tenants and 287 by owners or managers. Practically the entire irrigable acreage was utilized. Few farms were sold during the year. Practically no loans were being made by the local bank. The only loans available to the farmers were from the Reconstruction Finance Corporation, and these were for small amounts. No money was available for agricultural purposes from any source at the close of the fiscal year.

Engineering.—No engineering work was in progress during the year and all activity on the project was confined to the operation and maintenance of the canal system.

RIO GRANDE PROJECT, NEW MEXICO-TEXAS

Economic.—Practically all of the project is in private ownership and is approximately 95 per cent in cultivation. There were 4,500 irrigated farms in 1931, of which 3,021, or 67 per cent, were operated by owners or managers and 1,479 by tenants. Only a few large tracts are developed in areas of several hundred acres, and, although several farms exceed 160 acres, the typical farm was probably from 60 to 120 acres. Some farms near El Paso were subdivided for suburban property and some were broken up into smaller farms.

There is a wide opportunity and urgent need for further improvement and development in the livestock industry and diversified farming. In the spring of 1932 there was a noticeable change toward more diversified farming. The most conspicuous shift was the increase in alfalfa from 28,770 acres in 1931 to 33,764 acres in 1932, an increase of 17.4 per cent. Most of this was taken from land previously planted to cotton. There has also been a marked expansion in truck acreage and some in small grains. The acreage of such crops as cabbage, onions, lettuce, tomatoes, and hegari rose materially which no doubt will reduce the cotton area about 6,000 acres, or from 64 per cent of the cropped acreage in 1931 to about 56 per cent in 1932. There was a substantial increase during the year in beef cattle, dairy cattle, sheep, and hogs, amounting to about 24 per cent, whereas all fowls showed a decrease of 8 per cent.

The milk producers on the project formed a distributing organization known as the Elephant Butte Dairy League, which is farmer owned and operated. In the spring of 1932 a 1,000-can capacity custom cannery was established in the El Paso Valley. For the benefit of the cotton growers there are 38 cotton gins on the project with 6 or more in the Hudspeth district below the project, 5 cotton compresses, 6 cottonseed-oil mills, and 1 cotton-textile mill. El Paso's commercial and industrial activities directly or indirectly broaden

the opportunities of a local market for farm produce. The city offers a market for a large amount of whole milk produced on the project dairy farms. There are three milk cooling plants on the project besides the plants in the city, and a new creamery was being completed at the close of the fiscal year. In El Paso are a number of cold-storage wholesale and commission produce establishments serving the city's trade territory. Power transmission and distribution lines from a large modern steam generating plant located near El Paso reach almost all parts of the project.

Cooperative producing, buying, and selling associations include the Southwest Irrigated Cotton Growers Association, Elephant Butte Alfalfa Growers Association, Mesilla Valley Fruit Association, El Paso Valley Bartlett Pear Association, El Paso Egg Producers Association, Elephant Butte Chili Growers Association, and Elephant Butte Dairy League.

Some of the cotton-processing plants are still farmer owned and operated on a profit-sharing basis, but recent economic conditions caused many of the cooperative plants to be turned over to a large corporation, which operates locally as well as throughout the South and Southwest. The Dona Ana County Farm Bureau with several "locals" functions in the New Mexico division of the project and the El Paso County Farm Bureau, with its "locals" functions in the Texas division. The New Mexico Agricultural College and Experiment Station are located near Las Cruces and furnish a great deal of assistance to project farmers in carrying on investigations and giving advice. Electricity and telephone service are available to practically all parts of the project, affording greater conveniences to rural life. Social intercourse is broadened by the farm bureau meetings, rural clubs, churches, and community centers.

As a result of the economic depression new improvements, both farm and public, decreased. Crop financing was more and more difficult to obtain and there was probably some further increase in mortgages where they could be negotiated. The total bank deposits decreased from \$30,400,000 in December, 1930, to \$17,550,000 in December, 1931, and the number of depositors from 40,000 to 24,400. Notwithstanding the general depression, delinquencies in payment of the project operation and maintenance charges to the Government have been relatively small.

Engineering.—There were 1.57 miles of drain constructed in the Elephant Butte Irrigation District, which will provide drainage for about 150 acres of land besides furnishing better protection to adjacent lands. This work was discontinued, owing to economic conditions and to the unwillingness of water users to furnish the necessary right of way on the remaining proposed spur and intercepting drains. The only work performed in the El Paso County Water Improvement

District No. 1 was the extension of the Alamo Alto drain into a small seeped area by the water user who owns the property; 700 linear feet of the work was completed.

The most urgent work remaining is the extension or improvement of drainage facilities for the remainder of the irrigable area, or for about 6,000 acres scattered throughout the project. This will require extensions to some drains and a number of short branch drains.

Financing of the drainage construction in the Elephant Butte Irrigation District was brought about through a contract dated December 20, 1929, by increasing the district's construction liability by \$450,000, of which \$260,000 is to apply as credits for land taken for drainage rights of way. Additional drainage construction in the El Paso County Water Improvement District No. 1 is urgently needed, but is contingent upon further financial arrangements. Through this part of the project river straightening and flood protection are considered essential, but these must be left to other agencies than the bureau.

BAKER PROJECT, OREGON

Economic.—Construction of this project was approved by the President March 18, 1931. The plans provide for furnishing a supplemental water supply to an area of 7,000 acres of land in lower Powder River Valley, about 18 miles northeasterly of Baker City, Oreg., already settled and partially served with water from canals diverting from Powder River. The lands are now farmed to the limit of the available water supply, and the increased crop production to result from the supplemental water supply will, it is believed, be reflected in an increase in crop values much larger than the cost of the proposed irrigation works. A contract has been entered into with the Lower Powder River Irrigation District to provide for construction of the project and repayment of construction cost of \$200,000.

Engineering.—Only activities of a preliminary nature were carried on in fiscal year 1931. Contract was awarded for the construction of Thief Valley Dam, forming a reservoir of 15,000 acre-feet capacity for further supplemental water supply. This dam (Specification 523) was completed by contract and turned over to the Lower Powder River Irrigation District for operation on June 1, 1932. The dam is located on Powder River $7\frac{1}{2}$ miles north of North Powder, Oreg. The dam is of a buttressed reinforced concrete type with reinforced-concrete face slabs. It is 380 feet long, of which 270 feet is the spillway, and is 66 feet high, containing 6,300 cubic yards of concrete. The outlet works are two $4\frac{3}{4}$ by 6 foot openings near the bottom of the upstream face of the dam. These are protected by trash racks and equipped with cast-iron sliding gates operated by a gasoline engine.

UMATILLA PROJECT, OREGON

Economic.—East division: Since the reclassification and cancellation of certain lands within the district the irrigable area amounts to approximately 10,940 acres, for which the distribution system is prepared to deliver water. The area irrigated is about 7,300 acres.

There was an increase in all classes of livestock during the year, but a decrease in values. The Farm Bureau Cooperative Association made good progress and furnished the settlers with cheap feed for chickens, turkeys, and other stock. A cooperative creamery which started about July 1, 1931, doubled its membership during the past six months. The present tendency is toward a larger acreage in pasture, at the expense of the alfalfa-hay acreage, as the farmer reduces his labor cost by this method.

West division: On account of the low prices for butterfat and the decreased productivity, especially in the Boardman district, due to increased water-logged conditions, eight farms were taken over during 1931 by the Federal land bank for delinquencies.

Unpaid State and county taxes were increasing on the lands in the Boardman district. As a rule, however, the smaller places with a strawberry patch, a good family garden, and a few good cows were weathering the times, and the owners were paying up taxes and other obligations fairly well.

VALE PROJECT, OREGON

Economic.—Public Order No. 5 was issued February 9, 1932, announcing the availability of water for private lands in the Bully Creek East Bench division and opening three public land farm units to entry. Good progress has been made by settlers in this division since water was made available this spring, 984 acres having been seeded to crop by 15 owners and a number of new homes constructed of the more permanent type. Additional lands were being cleared, leveled, and cultivated in preparation for fall seeding.

In the Harper and Little Valley and the Bully Creek West Bench divisions nearly all of the farms were operated by the owners. Crop yields were good but prices were low for all farm products, except onions, for which exceptionally good prices were received. Development of new land was also under way in these divisions.

The Vale-Owyhee Land Settlement Association continued to function throughout the year, being active in securing a number of new settlers; 1,832 inquiries were received by the association during the year and 162 interested persons called at the office.

Two excellent highways traverse the project and a market road has been constructed through the Bully Creek East and West Bench divisions to connect with the main highways.

Engineering.—During the fiscal year $2\frac{1}{2}$ miles of main canal were excavated; 1,175 linear feet of concrete lining placed between stations 1082 and 1093; and 5 miles lined with earth, completing the Vale main canal to mile 46. The lateral system, including appurtenant structures, was completed for the Bully Creek East Bench unit. Three and one-half miles of telephone line were constructed, completing the telephone system from Vale to Harper, Oreg., a distance of approximately 25 miles. Forty-five miles of operating roads were constructed on the Bully Creek East Bench and irrigable area surveys completed.

Construction of the proposed storage dam and reservoir on the North Fork of Malheur River, for which 75 per cent of the right of way has been contracted, is contemplated when funds are made available. This additional storage is necessary to assure an adequate water supply for the irrigable area.

Appropriations of approximately \$1,500,000, in addition to those previously made, will be required to complete construction of the project.

KLAMATH PROJECT, OREGON-CALIFORNIA

Economic.—The main division of the project contains 581 farms, 517 of which were farmed during the calendar year 1931. Of the irrigated farms, 367 were cultivated by owners and 150 by tenants. In the Tule Lake division there were 264 farms, of which 215 were operated by owners and 49 by tenants. No difficulty has been experienced in getting settlers for lands in this division. For the 68 farm units containing 4,752 acres of irrigable land, opened to entry on October 16, 1931, there were 185 qualified applicants, a few of whom showed assets in excess of \$10,000 each, the majority, however, having from \$3,000 to \$6,000 worth of property, mostly in equipment and stock. The Langell Valley, Horsefly, and Shasta View districts have had little or no success in obtaining purchasers for the uncultivated lands within their boundaries.

The 1931 crop yields were average, but prices for all farm commodities were the lowest in years. Alfalfa hay sold in December for \$6 to \$7 per ton but jumped to \$15 in February, 1932, after practically all had been sold. Owing to exceptionally poor range conditions, project pastures carried an unusually large number of livestock during the season of 1931. For the same reason all of the immense crop of rye hay raised in the Tule Lake sump area was sold.

Cooperative organizations operating during the year were the Malin Cheese & Produce Association, the Langell Valley Dairymen's Association, the Klamath County Dairymen's Association, the Klamath Hay Growers' Association, Klamath Potato Growers' Association, and the Klamath Poultry Producers' Cooperative Association.

Engineering.—In the Tule Lake division flood protection, distribution, and drainage systems serving the entered lands, the turnout and drop from the Lost River diversion channel to Lost River, and drainage pumping plant No. 5 were completed during the year. On the first 9 miles of the "J" Canal 11 major structures were enlarged or reconstructed. In the Tule Lake sump 8.5 miles of distributing canals and two minor structures were completed.

On the drainage system for the Klamath Irrigation District 22.5 miles of drains were deepened and enlarged, 15 miles of new drain constructed, and 250 minor structures installed.

During 1933 it is planned to complete the enlargement of the first 9 miles of the "J" Canal and to continue work on the enlargement and extension of the drainage system in the Klamath Irrigation District.

To protect the remaining 13,000 acres of unentered lands in Tule Lake division from becoming water-logged, several miles of additional drains should be constructed if funds can be made available for this work.

OWYHEE PROJECT, OREGON-IDAHO

Engineering.—The Owyhee Dam was 97 per cent finished and the time 86 per cent elapsed at the close of the fiscal year. Work remaining to be done comprised placing the plug in the diversion tunnel, completing concrete pours in the downstream section of panel No. 4, cleaning up, and grouting the contraction joints.

Excavation of the inlet end of tunnel No. 1 had been completed and about 1,000 feet of concrete arch placed, leaving $1\frac{1}{2}$ miles of concrete lining to be placed to finish the contract, which was 68 per cent complete with time 63 per cent elapsed. Intake works, not included in this contract, are to be built immediately after its completion.

The contract for the outlet end of tunnel No. 1 was complete except for cleaning up and the channel change at Tunnel Canyon. The excavation was completed on February 7, 1932, and concrete lining to station 186+80 finished on May 27, 1932.

The upper end of tunnel No. 5 was completely lined to station 2+69, the end of contract, on February 9, 1932, 20 months ahead of schedule.

On July 1, 1932, the excavation of the lower half of tunnel No. 5 had reached a point 8,850 feet from the outlet portal, leaving 2,132 feet to be completed before concrete lining was begun. Good progress was being made using steel liner plates, and it was expected that this tunnel would be holed through before 1933. The contract was about 61 per cent complete and the time 52 per cent elapsed.

Some clearing and earthwork had been started under schedule No. 1 of the North Canal contract. Excavation was expected to commence in July, and should be completed by April, 1933.

Excavation of tunnel No. 3 was finished on June 19 and that of the approach tunnel on June 6. Concrete lining of both tunnels was well under way. The rock cut at station 30 was 25 per cent completed. This contract was 45 per cent finished and the time 27 per cent elapsed.

Project needs.—There will be early need for the construction of the intake works at tunnel No. 1 in order that water stored in Owyhee Reservoir in 1933 will not endanger the completed structures. Additional contracts for distribution systems, canals, and structures should be let as soon as funds can be made available in order to permit delivery of water to project lands.

BELLE FOURCHE PROJECT, SOUTH DAKOTA

Economic.—Project development was handicapped by a water shortage in 1931 and low prices for farm products. Alfalfa hay, which sold at about \$12 in the stack, was the only crop that brought fair returns, but sales were limited on account of low yields and the need of feed for livestock on the farms. A persistent drought extending over two growing seasons was effectually broken by abundant rains that began the latter part of April and supplied sufficient storage water for maximum irrigation needs in 1932. At the close of the fiscal year crop conditions were excellent, but price levels were discouraging and acted as a bar to expansion of farm operations.

Closer settlement of the project farms remains the outstanding factor in greater production and more intensive cultivation. Buildings on the unoccupied places and other general improvements, including fences, ditches, and a permanent cropping system, can not be realized under recent agricultural conditions and with the trend on the project away from resident ownership. Tenancy has increased steadily since the war, mounting from 36 per cent in 1923 to 55 per cent in 1931. Sixty-seven land transfers in 1931 involved principally mortgage foreclosures or tax deeds taken by the county, and only two had to do with new settlers. Twenty-two per cent of the farms have resident owners, 26 per cent are occupied by tenants, and 52 per cent have no residents, although they are largely in operation under the rental plan.

Values of crops produced in 1931 fell materially below the figures of the previous year under the handicap of low prices, water shortages and a generally adverse growing season. Returns totaled \$685,000 compared with \$1,204,000 in 1930 and an average of \$874,000 for the past 10 years. Sugar beets made up 43 per cent of the value of crops in 1931 and, although the tonnage was somewhat reduced, the sugar content was good with an average of 16.48 per cent.

The contract of October 4, 1927, supplemented by the revision of September 1, 1931, provides a scale of repayments based on the producing capacity of the soils, the heavy clay receiving the greatest benefit with annual construction assessments fixed at 75 cents per irrigable

acre. Payments due the United States were met with the exception of an arrearage of about \$12,000 at the end of the calendar year. This amount was later funded under the relief act of April 1, 1932, so that the district had no unpaid financial obligations at the close of the fiscal year. About \$50,000 was in the general fund, most of which will be needed as working capital when the district assumes full control of the project at the end of 1933.

Engineering.—Construction of open drains progressed through the fiscal year, although the contracted portion was completed late in 1931. A total of 33.4 miles was added under contract and 3.2 miles by Government force, making a grand total of 200.4 miles of open drains and 1.98 miles of closed drains. Minor additions and extensions by Government force were still in progress, but it was expected that the entire program would be completed in the field season of 1932. A complete drainage system was installed in the South Canal banks, mile 11.3, where unstable material and seepage had caused settlement in the original fill.

SALT LAKE BASIN PROJECT, UTAH

WEBER RIVER DIVISION

Economic.—During the spring months of 1931, 19,200 acre-feet of water were stored in the Echo Reservoir, most of which was stored following the construction of the necessary roads as replacements of those formerly used through the reservoir area. In view of the fact that the stream flow for 1931 was the lowest of record in the history of the State, this amount of storage water, although small in comparison with the total irrigated area, was exceptionally valuable for maturing fruits, vegetables, and sugar beets. At least 30 per cent of the gross value of all crops resulted from the use of the storage water.

The lands of the division have been farmed and partially irrigated for many years. They are all in private ownership and occupied mostly by the owners. The holdings on about 60 per cent of the area, comprising the bench lands generally adjoining the cities and towns, average less than 30 acres and consist of highly developed land used largely for the growing of fruits, berries, vegetables, sugar beets, and alfalfa. The remainder of the holdings contain 30 to 80 acres each, where hay, grain, and sugar beets are the most important crops and where dairying and stock raising are profitable industries. Most of the farmers live on their farms.

The division is well supplied by a large number of fruit and vegetable canning factories, several fruit packing plants, 3 sugar factories, 3 or 4 creameries, and 1 meat packing and by-products plant. In normal times these industries do very well. In 1931, however, they were affected by the depression, although not to the extent experienced by other industries.

The associations organized for the cooperative production and sale of canning and packing crops, sugar beets, dairy and poultry products, sheep and cattle, aid materially in improving the quality of the agricultural products and finding markets for them.

The program of the Wasatch Gas Co. of extending gas lines to practically all cities and towns in the division has been completed. Electricity is available to all parts of the division, including the rural districts.

The general economic condition of the farming districts continues good. Although the effects of the depression are felt by all the farmers, very few, if any, farms were abandoned in 1931, and mortgage foreclosures were limited to a comparatively small number. The gradual and constant increase in the construction of modern farm homes indicates the stability of the rural districts.

The value of farm crops in 1931 varied from \$9 per acre on hay and grain lands where the water supply was deficient to as high as \$150 per acre on fairly well irrigated fruit lands. The average crop value was estimated at \$15 per acre for 60 per cent of the division area and at \$56 per acre for the remainder. There will be a considerable increase in the higher-priced crops with the full use of the Echo Reservoir.

Engineering.—The first unit of the Salt Lake Basin project comprises the construction of the Echo Dam and the Weber-Provo Diversion Canal at an estimated cost of \$3,000,000.

The completed project furnishes a water supply of 74,000 acre-feet as a supplemental supply for 60,000 acres of land in the lower Weber and Ogden valleys, and diverts surplus flood water and Echo Reservoir exchange water through a diversion canal 9 miles long from the Weber River watershed to the Provo River for a supplemental supply for 20,000 acres in the Provo Valley.

A contract has been executed with the Weber River Water Users' Association for the repayment of the construction cost of this project. At the close of the fiscal year the association had disposed of more than 94 per cent of the stock of approximately 70,000 shares.

The construction of the main structure was completed on October 7, 1930. Construction of the parapet wall across the top of Echo Dam was completed on November 24, 1931, by Cox and Christiansen, contractors.

Echo Reservoir reached a maximum stage of 5,552.5 feet on June 30, 1932, at which level the storage content was 63,000 acre-feet. The year 1932 was one of abnormal run-off and water was available to fill the reservoir. On account of the fact that the dam was just recently completed water was wasted and the water surface was not permitted to rise at a rate in excess of 2 feet per week after it had reached the spillway sill at elevation 5,543.

The road serving the farms on the west side of Echo Reservoir was completed during the early part of the fiscal year.

The Weber-Provo Diversion Canal was completed on April 23, 1931, by S. H. Newell & Co. The present construction is for 210 second-feet, the ultimate 1,000-second-foot capacity awaiting the future construction of the Deer Creek Reservoir on the Provo River. A number of minor canal structures were completed during the first half of the fiscal year 1932 by force account.

The project is now operated by the Weber River Water Users' Association.

Total gross construction cost of the completed project was \$2,825,-286.95 on June 30, 1932.

STRAWBERRY VALLEY PROJECT, UTAH

Economic.—Precipitation for the year was slightly above average in the low watersheds but less than average on the higher watersheds, with a yield to Strawberry Reservoir of 85 per cent of average. The crop yield was good, particularly that of alfalfa hay. Tenancy has decreased. Cooperative marketing conditions were less advantageous to the water users than a year ago.

Engineering.—Construction was completed in 1918, since which time only regular maintenance and minor betterments have been made to the works. The water supply has been handled by a commissioner on the Spanish Fork River under the direction of the State engineer. This has resulted in conservation of the water supply. The electric connection with the Utah Power & Light Co. for the intersale of power, which was completed July 18, 1931, has proved highly satisfactory, providing complete breakdown service and an outlet for surplus power generated.

OKANOGAN PROJECT, WASHINGTON

Economic.—Apple production on the project reached a total of 1,000,000 bushels, an increase of 62 per cent over the 1930 crop, but the amount of money received for the crop was 30 per cent less than the previous year. There was a further shrinkage in the population on the farms caused by the abandonment of marginal lands and the cancellation of water rights on farms to which the district had acquired title through nonpayment of taxes. A sawmill and box factory was erected at Okanogan to replace the mill that was burned in 1931. One bank failure on the project has resulted in a further reduction of bank deposits.

Engineering.—With the limited supply of water available for the irrigation of lands on the Okanogan project, it is highly essential that further improvement be made in the canals and laterals so as to reduce

seepage losses. Approximately \$5,000 was spent in the spring of 1932 in making needed improvements.

YAKIMA PROJECT, WASHINGTON

SUNNYSIDE AND TIETON DIVISIONS

Economic.—The shortage of water in 1931 necessitated the distribution of storage on a 75 per cent basis after July 1. Several irrigation districts had exhausted their allotments by the end of August. Natural flow rights were reduced to 80 per cent of normal during August and September. Distribution of the reduced water supply was made with the cooperation of representatives of the 18 irrigation districts receiving water service from the Yakima River system, with the result that crop losses due to the insufficient supply were held to a minimum.

Crop reductions were attributable to decrease in the cropped acreage in anticipation of a water shortage and because of low prices and other causes rather than to reduced per acre yields. Many of the poorer lands and others burdened with high local improvement assessments were being abandoned on the Sunnyside division and allowed to go to the county and the districts for taxes. The transfer of water rights from unproductive land for use as a supplemental supply on good land resulted in a further reduction in the irrigable area on the Tieton division. Tax levies for 1931 were decreased about 10 per cent, and those for 1932 will probably be reduced further. There were also some substantial reductions in valuations of farm property.

There are about 65 industries on the project, including lumber mills, fruit and vegetable canneries, fruit-evaporating plants, meat-packing plants, sash and box plants, bakeries, building material plants, and spray, cheese, bottling plants, etc. Some increases were made in warehouse, cold-storage, and packing plant facilities for handling fruit. A number of cooperative associations have operated successfully for a number of years, handling fruit and vegetable crops. In the recent depression these associations have aided the fruit grower materially in financing the production of crops.

There were 86,582 acres irrigated in 1931 on the Sunnyside division, comprising 3,379 farms, or 78 less than the previous year, of which 2,161 were operated by owners and 1,218 by tenants. Alfalfa continued the principal crop in area. Substantial increases in the number of dairy cattle and hogs indicate a trend toward a more self-sustaining type of farming. Dairying was the most profitable of the farming projects until near the end of the year when butterfat prices declined sharply.

The irrigated acreage on the Tieton division was reduced to 25,800 acres, or 4½ per cent, owing largely to the transfer of water on a lease

basis as a further means of meeting the shortage. The number of irrigated farms declined from 1,380 to 1,330, of which number 87½ per cent were operated by owners. The acreage planted to fruits increased from 17,286 to 17,402 acres with a corresponding reduction in general farm crops. The returns on fruits, comprising 71 per cent of the gross area cropped, amounted to 90 per cent of the total crop valuation.

The Pacific Power & Light Co. carried out an extensive program of construction, chiefly in extending lines in rural districts. The Yakima Fruit Growers' Association made additions to its Sunnyside plant at a cost of \$25,000. An old frame school building at Outlook was replaced with a modern brick structure costing \$25,000. Two Grange halls were built within the Sunnyside division at a total cost of \$17,000. The Tieton Storage Co. reconstructed its cold-storage plant, increasing the capacity from 80 to 140 cars.

Applications were filed early in the year by the seven irrigation districts under the Sunnyside division for extension of time for payment of construction charges. A special committee, consisting of representatives from the legal, economic, and accounting divisions, conferred with the directors of the several irrigation districts in October, 1931. Negotiations continued throughout the year, resulting in the execution of adjustment contracts under the act of May 25, 1926, for the benefit of three districts, extending the time of payment to the full period of 40 years. Negotiations were in progress with the other four districts at the close of the fiscal year with a view to securing reductions in the mortgage indebtedness in order that the proposed extensions might serve more effectively to relieve the actual water user.

The water requirement was determined for lands covered by certain supplemental water-right contracts under the Sunnyside division, and public notice issued advising the water users of the water duty established.

KITTITAS DIVISION

Economic.—Water was delivered this spring to 44,569 acres of irrigable land. Delivery was made to 65 landowners under the Main Canal, 123 landowners under the South Branch Canal, and 337 landowners under the North Branch Canal, who had signed up for the delivery of water on a rental basis. The Kittitas reclamation district has requested that the canals and laterals be operated by Government forces during the calendar year 1933. The Northern Pacific Railway Co. and its subsidiary, the Northwestern Improvement Co., had sold at the appraised valuation all except 376 acres of their irrigable lands. There are a few tracts of privately-owned land for sale which were being cleared of timber and sagebrush. The chamber of commerce and the Ellensburg office of the bureau continued distri-

buting printed matter and answering inquiries relative to the project. During the year about 400 inquiries were answered by the chamber of commerce.

As the main body of land in the Kittitas division practically surrounds an area which has been successfully farmed under private irrigation systems for a long period of years, the matter of providing financial and other assistance to project settlers is largely one of expansion of existing facilities. The present Kittitas County banks serve as one source of credit, and farm loans from the local organization of the Federal land bank will no doubt be available in the near future. The Farmers' Loan Corporation was organized to assist farmers in the purchase of livestock and is carrying loans in the amount of \$157,000. A savings and loan association with a capital of \$225,000 has been operating five years.

The Kittitas Dairyman's Association, with a capital of \$50,000, has been operating successfully since 1924. The Extension Service, the Kittitas Farm Bureau, and the county agent are cooperating in a program of assistance to farmers in agricultural economics, soil fertility, irrigation, and drainage. The Ellensburg Chamber of Commerce, the State Department of Agriculture, and local orchardists were instrumental in securing a 5-year fruit frost survey of project lands, to determine whether the project lands are adapted to commercial fruit raising. This survey was started in the spring of 1930 and is being carried on cooperatively by the United States Department of Agriculture, Weather Bureau, and Kittitas County. In the fall of 1930, Libby, McNeill & Libby established a small pickle canning plant at Ellensburg which has been operating since that time. The California Packing Corporation and the Moscow Idaho Seed Co. have established cleaning mills and were contracting for the growing of seed peas of the garden and canning varieties. The Utah Idaho Sugar Beet Co. contracted for about 900 acres of sugar beets to be raised in the valley this year. These beets will be shipped to the factory at Bellingham, Wash.

Engineering.—Construction was completed of the balance of the North Branch Canal laterals. A 5-room cottage was built at the Yakima River pressure tunnel site. Work was in progress on the construction of the Wippel pumping plant. Future work comprises the construction of the North Branch Canal wasteways. Work by Government forces included repairs to the Yakima River pressure tunnel, installing the electrical system for the operation of the needle valves at Yakima River pressure tunnel wasteway, building a garage and warehouse at the Yakima River pressure tunnel site, constructing additional small lateral structures where necessary, and the operation and maintenance of the canals and laterals.

KENNEWICK DIVISION

Rehabilitation of the Highlands unit was undertaken early in the year under an appropriation of \$640,000. Of this amount \$196,000 was allotted for the reconstruction and enlargement of the pumping and irrigation system serving the Highlands area at Kennewick to deliver an adequate water supply for the irrigation of 4,000 acres of land. This work was done under seven small construction contracts supplemented by Government forces.

The balance of the appropriation was being utilized for the construction of a power canal and a 4,200-horsepower hydroelectric power plant at Prosser under a contract with the General Construction Co. The canal is about 2.4 miles in length and has a designed capacity of 1,100 second-feet. The diversion works are located at the Prosser Dam, which was acquired under the terms of a contract with the Kennewick irrigation district. Under this contract the Highlands unit is to receive 1,200 kilowatts of electrical energy from the development, the remainder being allocated to other districts in the valley for irrigation pumping.

The transmission of power to Kennewick and to other districts within a 60-mile radius is arranged for in a contract with the Pacific Power & Light Co. under which all surplus power is disposed of and breakdown service obtained through a connection with the 66,000-volt transmission line of the company.

The work on both features was practically complete at the close of the fiscal year and power was expected to be available for the Highlands unit by August 1, 1932, to replace commercial power.

STORAGE DIVISION

Cle Elum Reservoir.—The construction of the enlarged reservoir at Lake Cle Elum was begun early in 1932 following satisfactory adjustment with State officials relative to permits to appropriate the public waters of the Yakima River. Contracts for the repayment of construction costs had been entered into early in 1931, and the work authorized. The reservoir is the last and largest unit of the project storage system. Plans contemplate raising the water level in the lake an additional 115 feet to provide an ultimate total capacity of 435,000 acre-feet at an estimated cost of \$2,600,000.

The construction of the dam is being carried out under contract with Winston Bros. Co. Clearing of 2,700 acres of reservoir area is provided for in a contract with the Lahar Construction Co. Camps were established and construction roads were built. The dam site and borrow pits were cleared, grubbed, and stripped. The old crib dam was removed and the work of enlarging and deepening the river channel for 1 mile below the dam site was practically completed.

The main feature of the work during the fiscal year was the construction of the reinforced concrete outlet tunnel and appurtenant structures. At the close of the year the tunnel was completed to a temporary adit located a short distance above the outlet and the discharge of the lake was diverted through the tunnel preparatory to undertaking the construction of the main embankment. The gate shaft was also excavated and concreted up to an elevation slightly above natural ground. Control of about 33,000 acre-feet of storage water made available at this stage of construction is provided by the permanent installation of two emergency butterfly gates. Excellent progress was made on the clearing of the reservoir area. At the end of the fiscal year the two contracts were 42 per cent and 84 per cent completed for the dam and clearing, respectively, with 32 per cent of the time elapsed.

Work by Government forces consisted chiefly of construction of a concrete testing laboratory and the engineers' camp, including roads, domestic water system, sewer system, etc. Two wells were also sunk and pumps installed for furnishing a substitute water supply for the town of Cle Elum.

In addition to the appropriation of \$500,000 provided for the fiscal year 1933, further appropriation of a like sum will be required to complete the dam.

A camp was established at Lake Kachess and work started on an estimated 3-year clearing program at this reservoir. Good progress was made with the result that the work was about 50 per cent complete at the time operations for the year were discontinued at the end of October, 1931. The steel discharge pipes at Tieton Dam were repainted, requiring the scraping and cleaning of about 2,000 square yards of surface. Biturine enamel with suitable priming coat was applied to one pipe under contract carrying a 5-year guaranty; the second was painted by Government forces using a priming coat of water-gas tar and a finish coat of coal-gas tar.

RIVERTON PROJECT, WYOMING

Economic.—The gradual increase in farming operations continued, and there was a material improvement in farming methods. All new settlers who had actually occupied the land and begun farming were confident of their ability to succeed. While they have little or no money, they owe little and are to an unusual extent self-sustaining.

The greatest need of the project is for more settlers on both public and private land. As a result of conferences between representatives of the Washington office, the project office, the town of Riverton, State and county agencies, and the Chicago & Northwestern Railroad, the Riverton Development Association was organized to bring about the early settlement and development of the project. The project is also

being actively advertised by the State Department of Commerce and industry, the railroad, and the Washington office, and it is expected that these concerted efforts will result in a marked influx of settlers. With this in view 43 additional farm units on the Pavillion and Pilot divisions were opened to entry on June 1, 1932.

SHOSHONE PROJECT, WYOMING

Economic.—The project water supply was ample and production held up well. Shipments of agricultural products for the year totaled 1,651 carloads and of livestock 79 carloads. Compared with 10 years ago, there is little change in the total number of cars. At that time, however, more than half of the shipments were alfalfa hay and meal. Last year only two cars of hay were shipped, its place being taken by beans and peas and an increased tonnage of sugar beets and potatoes.

The 1930 crops were on the whole remunerative so that the farmers and business men did not enter 1931 with the caution that was elsewhere so evident. As the 1931 price scale continued to drop, commitments were viewed with more and more fear. Local credits were contracted to the foreclosure point as the crops were harvested and were expanding practically not at all as the 1932 crop went in. Federal seed and crop loans for 1932 in the Garland division totaled about \$17,000 and on the Frannie division about \$9,000. On the Willwood division, in so far as practicable, the construction and operation and maintenance work was parceled out to the water users with the result that about \$4,000 of operation and maintenance charges were so earned. These activities have made it possible for practically all the farmers to carry on for the year.

The influx of persons to vacant farm premises depressed the labor market so that the usual farm wage was \$1 per day and board.

The Park County Bank, of Powell, was merged with the First National Bank of that town January 6, 1932. No deposits were frozen in the operation. The change undoubtedly strengthened the banking situation in the community.

Progress of new and established industries.—The activities of the Associated Seed Growers during the past winter and on the 1932 crop furnish a bright spot in the picture. Crops of peas and beans of this and other companies in 1931 covered 2,650 acres and made practically guaranteed cash returns of \$30 per acre. For 1932 the area is 4,800 acres and the estimated return \$25 per acre. Also in the fall and winter of 1931–32, when all other work was at a standstill, this company maintained at Powell a pay roll of \$3,500 per month in cleaning and picking seed compared with a similar activity amounting to \$2,500 per month the previous season. This helped the whole project as Powell is strictly a project town and prospers and suffers as does

the farmer. Foresight was exercised in the gathering of foods in the fall and the whole community passed the winter with very little suffering, with no outside relief, and without severe drains on local charities.

Lamb feeders made a fair profit on the 1931-32 feeding program and furnish another bright spot.

Cooperative organizations.—Cooperative selling is confined principally to Great Northern beans, turkeys, potatoes, livestock, and wool. The Big Horn Marketing Association, a farm bureau organization, handles the first two items. They shipped about 100 cars of beans each in 1930 and 1931, or about 55 per cent of the crop. In 1930 they shipped from Powell 150,000 pounds of turkeys and in 1931, 119,000 pounds. This constitutes about 90 per cent of the crop from the vicinity of Powell. The association also buys farm implements for its members.

A potato marketing association has grown from 43 members at the time of the organization in 1929 to 110 members in 1932. In 1931 they shipped over 200 carloads of potatoes, or 30 per cent of the crop. The association buys potato growers' supplies.

Livestock is handled informally by the extension service. A wool growers' association has operated since 1929. The Consumers' Supply Co. is a farm bureau organization which was started this spring with 39 members. It handles oil, gasoline, and tractor fuel for its members besides maintaining a public filling station. These associations average a moderate steady growth and are increasingly useful to the community as their executives gain experience.

Settlement.—Six entries were made on the Willwood division during the fiscal year and one on the Garland division. Retarding influences may be summarized as follows: The choicest land in quality and distance from market has been taken; some prospects can not meet the financial requirements; other prospects are loath to sell out in their present location at the prevailing low prices. The farm population of the project increased during the year, and many buildings vacant for years were again tenanted. With the exception of Willwood settlers most of the newcomers, who had been forced to seek the low rents and living costs of the small country homes were from the towns and cities.

Engineering.—The Deaver irrigation district in cooperation with benefited water users constructed 0.75 of a mile of deep open drain for the relief of seepage.

On the Willwood division 0.75 of a mile of open drain was deepened and 0.86 of a mile of closed drain was constructed. An 11-mile extension of the Willwood canal system was built to cover the east slope of Whistle Creek. This work completed all but about 1.5 miles of the

lateral system of the division which it was planned to finish early in the fiscal year 1933. The drainage work is of a continuing nature carried on as seepage develops sufficiently to indicate the proper remedial measures.

A third unit of 6,000 horsepower was installed at the Shoshone power plant. The machinery was on acceptance run September 15 to October 14, 1931, and performed satisfactorily. At the Shoshone Dam an experimental construction was installed in the end of the outlet tunnel from the east 58-inch balanced valve in an effort to devise a type of construction which will eliminate cavitation at these valves.

The principal construction work required on the project is additional drainage work on the Frannie and Willwood divisions. Negotiations were started last year on a supplemental agreement providing that this work on the Frannie division be done by the Deaver irrigation district with a small drag line purchased by the district and with funds to be collected as construction repayments under a 5 per cent crop repayment plan. These plans are, however, in abeyance because the district has accepted the relief provided by the act of April 1, 1932, and hence has collected no such funds.

SECONDARY INVESTIGATIONS

As a result of the second conference of representatives of the six States mentioned in section 15 of the Boulder Canyon project act, held in Denver, Colo. on June 9, 1931, a general plan for the investigation of the Colorado River Basin was prepared and was submitted at a conference held at Salt Lake City, Utah, on September 14, 1931, at which time the general plan was approved.

Funds for the investigation of prospective projects and kindred work are derived from appropriations by Congress, from contributions by States and other organizations for expenditures by the Bureau of Reclamation, and by direct payment by States and other organizations to personnel operating under the direction of or in cooperation with the bureau. Additional data become available for the use of the bureau as the result of work by other agencies wholly independent of the bureau's activities, involving the expenditures of large amounts which are not reported to the bureau. Federal funds for work done during the past fiscal year as hereafter described, including All-American Canal investigations and Roza division, Yakima project, were available from the acts of March 26, 1930, May 14, 1930, July 3, 1930, February 14, 1931, March 4, 1931, and April 22, 1931. Of \$103,683.23 disbursed by the bureau during the past fiscal year, \$90,390.82 was provided by the United States.

CALIFORNIA

Sacramento-San Joaquin Valley investigations.—During the year studies were continued at the Washington office for the utilization of the San Joaquin and Kings Rivers by means of storage at Friant, Temperance Flat, and Pine Flat Reservoirs, with varying capacities, singly and in combination. The advantages of incidental power development were also given consideration. In May, 1932, an engineer was detailed to resume field work in connection with various reservoir sites and canal lines preparatory to the continuation later of the formulation of a generally acceptable plan of relief for the upper San Joaquin Valley. A report on this work is anticipated for the coming fiscal year.

IDAHO

Boise Project—Twin Springs Reservoir investigations.—The report on these investigations was completed in June, 1932. The Twin Springs dam site is best adapted to a maximum capacity of 172,000 acre-feet, requiring a rise in water level of 311 feet. With 22,000 acre-feet of capacity set aside to produce head for power development, an installation of 26,000 kilovolt-amperes, costing \$1,225,000, could produce an average of 112,500,000 kilowatt-hours, with an estimated selling value of \$190,000 and a net annual income after allowance for operation and maintenance, interest at 4 per cent, repayment in 50 years, and depreciation of the power plant, of \$94,000. The dam would cost \$6,000,000, and if irrigation interests were allowed 40 years for repayment, the maximum time provided in the reclamation law, with credit throughout that time of net income from power, there would remain an annual charge of \$55,000 to be paid by the irrigator, an average of 30 cents per acre annually. On the basis of average crop prices for the past 15 years, the above charge would represent 20 per cent of the average increase in crop values resulting from the increased supply in water. The additional water may have that much value to the irrigator.

There is much room for improvement of irrigation practice, chiefly individual. With more efficient use of available supplies, the storage requirement could be materially reduced. There are also opportunities for reclaiming water wasted from the project, principally in drains, at less cost than for storage.

Other sources of additional water are by diversion of water from Salmon and Payette Rivers, and by pumping from Snake River to Deer Flat Reservoir with power to be generated at Arrowrock Dam. Of these, the Snake River pumping plan seems the most practicable in that the required investment is only a fraction of that with any of the other plans and it is free of uncertain features of cost such as always attend the construction of long tunnels.

Boise project—Salmon River diversion.—A report on this work was completed in June, 1932. The investigation was directed solely to the diversion of Salmon River in the vicinity of Red Fish Lake. The plans comprise (1) a low diversion dam and 2.8 miles of 9½-foot tunnel to divert Salmon River into Red Fish Lake; (2) a small earth-fill dam to raise the water level of Red Fish Lake by 26 feet and an outlet channel allowing 44 feet of drawdown, providing 102,000 acre-feet of storage capacity; (3) a 9-foot tunnel 7.9 miles long from the outlet channel at Red Fish Lake, southwesterly to the South Fork of Payette River, entering that stream just below Fern Falls; and (4) a 9-foot tunnel 6.25 miles long from South Fork of Payette River west to the North Fork of Boise River at a point about 1 mile below Badger Creek. The total cost is estimated at \$9,193,000. All tunnels would be concrete lined. The waters divertible from Salmon River and Red Fish Lake as determined from stream flow records near Stanley have been estimated sufficient to completely offset shortages that have occurred on the Boise project.

Rathdrum Prairie investigations.—A report on land classification and economics was completed in April, 1932. Of a gross area of 69,000 acres, commanded by the project, 43,683 acres were found to be irrigable, subject to a further reduction to 40,000 acres on account of lands occupied for right-of-way purposes and because of isolated areas too difficult to reach with laterals. Of these lands, nearly 10,000 acres are included in five active irrigation districts, of which four obtain their water supply by pumping from Hayden Lake and one by gravity diversion from Fish Lake. With the subnormal precipitation of recent years, Hayden Lake, which has no outlet, has lowered over 20 feet and its receding shore line has necessitated constant expenditures to maintain contact for the irrigation pumps with the lake, while outflow from Fish Lake has dwindled to almost nothing. On the pumping districts assessments of \$8 to \$10 per acre have caused considerable areas to be acquired by the districts and county for nonpayment of charges, while the amounts collected have been inadequate to enable retirement of outstanding bonds issued for construction purposes. Within the last year or two interest on the bonds has also been defaulted. Lands now irrigated largely produce fruit and garden truck for local markets. Lack of a market precludes expansion of these crops at this time. The undeveloped lands would be best suited to dairying with minor production of canning fruits and vegetables. The limit of annual irrigation charges for this type of agriculture is estimated at \$4.50 to \$6 per acre. Lands now irrigated and largely in higher-priced crops would in addition have to retire outstanding bonded indebtedness. There would be need for 900 new settlers with no source thereof evident at this time.

A report on engineering features was completed in June, 1932. For the irrigation of the entire area two plans were considered, one providing gravity water from Priest Lake, the other by pumping from Lake Pend Oreille, with power to be generated at Cabinet Gorge on Clark Fork River just below the Montana-Idaho State line. The Priest Lake plan provides for a storage and diversion dam 2 miles below the lake, with lake levels to fluctuate between elevations 2436 and 2450, for a storage capacity of 330,000 acre-feet. The regulated outflow will supply irrigation and logging requirements and leave 350 second-feet for the production of firm power. The main irrigation canal, with a capacity of 675 second-feet and 70 miles long, passes through a difficult country. Irrigation works are estimated to cost \$16,000,000, or \$400 per acre. With canal enlargement for 6 miles, and return of power water to Priest River at Rimrock Rapids with a head of 120 feet, an annual production of 25,300,000 kilowatt-hours, suitably varied to fit power markets, will become possible with an additional construction cost of \$881,000. Canal enlargement for a distance of 29 miles to the crossing of Clark Fork River at Albany Falls, where a head of 314 feet becomes available, permits an annual power production of 66,200,000 kilowatt-hours, with increased construction cost for power, amounting to \$2,398,000. Because of costly canal enlargement, this plan contemplates a uniform power output.

For the Pend Oreille pumping plan water is lifted 330 feet at the southwest corner of the lake to a canal 7 miles long, intercepting the Priest Lake Canal below all the difficult sections. Irrigation works for this plan, including 58 miles of transmission line from the power plant to the pumping plant, would cost \$6,047,000, or \$151 per acre. The power plant, with an operating head of 64 to 87 feet and an installation of 116,000 kilovolt-amperes would produce 644,000,000 kilowatt-hours annually after Flathead Lake is regulated, of which 68,000,000 kilowatt-hours would be used for pumping. The power development would cost \$14,889,000, exclusive of transmission lines. Assuming that irrigation works be constructed with interest-free funds, repayable in 40 years, the annual irrigation charge would be \$11.50 per acre in plan 1 and \$7.03 in plan 2. If the power developments could be financed with 4 per cent money, repayable in 50 years, and net income credited to irrigation charges, the annual charge would be \$9.91 to \$11.50 per acre in plan 1 and \$6.55 per acre in plan 2.

As neither plan resulted in a feasible project financially, consideration was also given to a project with a total area of 13,000 acres, including lands now irrigated, by pumping from Spokane River into Hayden Lake, and an increase in pumping capacity therefrom. Irrigation construction costs were \$97 per acre. The repayment

thereof in 40 years without interest and operation with power purchased for a local utility would result in annual charges of \$11.20 per acre. If to this plan there were added a power development at Rimrock Rapids on Priest River with Priest Lake water used for power instead of irrigation, at an additional cost of \$2,371,000, financed with 4 per cent money, and with surplus revenues credited to irrigation, annual charges for irrigation would be reduced to \$7.80 per acre.

Upper Snake River investigations.—Shortages in irrigation water have been chronic for many years on Teton and Fall Rivers, tributary of Henry Fork of Snake River, and some shortages have also occurred on the latter. The total shortage on these streams for the existing canals is estimated at 230,000 acre-feet in 1931. An investigation was initiated in May, 1932, to ascertain the extent of additional storage warranted by the situation and the most practicable sites for development.

Because of flood damage from Snake River near Rigby and future need for additional irrigation storage on the Snake River, an investigation will later in the year be undertaken of storage possibilities for irrigation, flood control, and power below Jackson Lake.

MONTANA

Musselshell River Basin.—Pursuant to contract of August 17, 1931, with the Musselshell Basin Flood Control Association, providing for preliminary investigations and report on irrigation and storage possibilities in the basin, with total costs not exceeding \$1,000 to be borne equally by the association and the United States, such an investigation was made early in the fiscal year with report thereon dated April, 1932. It was concluded that new projects are insufficiently attractive by reason of inadequate water supply, inferior soils, and heavy costs for consideration at this time. Existing irrigation ditches merit a supplemental water supply which is obtainable by means of reservoirs, but favorable sites are generally lacking. Deadman's Basin site, an inland site in the central portion of the basin, requiring a feed canal 12 to 15 miles long from Musselshell River, is sufficiently attractive to warrant detailed consideration when the prospect for availability of funds for construction purposes becomes more favorable.

Tongue River Investigations.—Occasional shortages of irrigation water for canals diverting from Tongue River near its mouth, amplified in 1931 to a general shortage throughout the main stream, together with recurrent flood damage near Miles City, led to a request for an investigation of storage possibilities to correct this situation. The most attractive reservoir site for these purposes lying just north of the Wyoming-Montana State line requires a costly dam and may even-

tually be found infeasible by reason of faulty rock structure. Although irrigation shortages might be alleviated by headwaters reservoirs, these shortages have not been so frequent or severe as to bring about a desire for the development of storage for and at the expense of irrigated lands alone. This condition may develop in time with increasing upstream diversions. The area now irrigated from Tongue River in Montana totals 17,000 acres and 8,000 acres additional appear to be capable of development.

Beaverhead River investigations.—The investigation, covered by a report dated November 5, 1931, was very superficial, the report merely presenting the situation of a shortage of irrigation waters for valley lands around Dillon and calling attention to the alternative possibilities of increasing storage reserves by raising the dam of the Lima Reservoir and by an increased fluctuation of water levels in large natural lakes. Detailed investigations of engineering features will be needed to decide on the most desirable plan. Lack of effective stream administration in the past with indiscriminate diversions of stored water has brought a breakdown in payments for the existing reservoir, with about half of the bond issue paid off. Any plan for improvement of conditions must include adequate measures to insure the delivery of stored water to its owners or as an alternative, sufficient storage reserves to make stream regulation unnecessary.

Victory irrigation district—Big Horn River.—This district of 2,400 acres located 1 mile above the mouth of Big Horn River is supplied by diversion from a slough subject to rapid silting. Reconstruction of the irrigation system to a plan that would effectively remove silt from diverted waters can not be carried out within the limits of the ability of the irrigators to pay. The most practicable plan appears to be the substitution of a pumping plant for the gravity diversion. A short report was issued on November 7, 1931.

NEVADA

Humboldt River investigations.—Early in 1932 an informal agreement was arranged with the State of Nevada for continuation of these investigations on a cooperative plan. The United States will direct or conduct the investigations; the State will make available such personnel of the office of the State engineer and of the University of Nevada as can advantageously be utilized, the State also to do such stream measurement work as may be desirable and practicable with its present staff. A bureau engineer was detailed to this work in May, 1932.

NEW MEXICO

Middle Rio Grande investigations.—The Middle Rio Grande conservancy district has had under construction in the past three years a system of flood protection, irrigation, and drainage works for the

rehabilitation of the valley of the Rio Grande from Cochiti to San Antonio, a distance of 125 miles from opposite Santa Fe to a point 12 miles above Elephant Butte Reservoir. Original irrigation of the valley antedates white settlement. Some 79 canals have been identified of which 55 are more than 200 years old. Irrigation reached its maximum about 1880, after which growing diversions in Colorado necessitated abandonment of many ditches. The depleted stream failed to cope with sand and silt brought in by tributaries and resulted in a rising river bed with consequent seeping of most of the valley lands. The district proposes with the aid of 153 miles of new main canals, 390 miles of drains, a storage reservoir at the El Vado site on Chama River of 200,000 acre-feet, and river levees, costing a total of \$10,000,000, to reestablish irrigability for 125,000 acres of land. The conclusion reached in the completed study is that this project will not impair the water supply for the Elephant Butte Reservoir, which serves the Rio Grande project. If the works are effective in preventing a further rise of the river bed, sand and silt that would otherwise be so deposited will pass onward to the San Marcial area and the Elephant Butte Reservoir. It is impracticable at this time to estimate the extent of resulting reduction of capacity in that reservoir. The leaching of the district lands to reestablish their irrigability will increase the salt content of Rio Grande project waters. A part of such increase will, no doubt, become permanent and necessitate more care to prevent destructive accumulations of alkali on the project.

OREGON

La Grande investigations.—A brief inspection was made of the situation at La Grande, where there was in 1931 a serious shortage in irrigation water, with a report thereon date November 4, 1931. There are practically no storage facilities on Grande Ronde River. Reservoir sites are available and ample waters for storage, but the high cost of storage combined with the agricultural depression and sufficiency of rainfall in most years for good grain crops precludes general support of a project for storage and canal extensions at this time.

UTAH

All investigations are conducted in cooperation with the State represented by the Utah Water Storage Commission, a group of 12 to 15 representative citizens from the irrigated sections of the State, appointed by the governor. Under this plan investigations have been under way since 1921 pursuant to a number of contracts of which those of May, 1929, and June 24, 1927, are the only ones now effective, the 1929 contract providing for investigations in Great Salt Lake Basin with costs to be met equally by the State and the Government, and the 1927 contract providing for investigations outside that basin at the sole expense of the State.

Cache Valley project.—During the year final locations were made for the gravity canal to Wellsville and Mendon, with a capacity of 80 second-feet for the irrigation of 5,000 acres, the pump canal with a capacity of 15 second-feet to irrigate 800 acres on Sterling Bench, and a lateral of 10 second-feet northerly from the reservoir to intercept laterals of the Hyrum Irrigation Co. In compliance with the Utah laws relative to the formation of irrigation districts, plats were prepared of the lands to be provided with distribution facilities, showing ownership and water allotments. Although only 6,000 acres are involved, the average holding is less than 20 acres and property lines often fail to coincide with legal subdivision boundaries, making extensive surveys necessary. Individuals have been furnished data on estimated annual costs for each tract. Congress enacted legislation permitting the formation of an association to contract with the United States for construction of the irrigation works. An election for a district to embrace areas requiring canals and to subscribe to stock of the association is anticipated in the immediate future. Constructed canal systems to receive supplemental water under association stock subscription contracts are being appraised for their values as security for proposed subscriptions. Formation of the district and of the association is expected to be completed early in the coming fiscal year. This has proceeded slowly because of a desire on the part of the promoters that everyone be fully informed and that no one opposed be included within the district.

Provo River division.—A final report on this investigation was issued in August, 1931. The principal feature is the Deer Creek Reservoir on Provo River with a capacity of 145,000 acre-feet and estimated to cost \$3,500,000. The dam site is 12 miles above Provo and water would be raised 175 feet by means of an earth fill dam; a branch line railroad and a main highway would require rerouting. Surplus waters of Weber River would be brought in by enlargement of the Weber-Provo diversion canal to 1,000 second-feet. A new low-gradient canal would be constructed at a cost of \$1,188,000 from the tailrace of the Olmstead power plant northward 22 miles to Jordan Narrows, with a capacity of 530 second-feet, the upper 2 miles being an enlargement of the Provo Bench Canal, to facilitate irrigation use of waters passed through the power plant. A new siphon would be added at the Jordan Narrows and a small new canal west of Jordan River to serve high lands to Magna. The total cost of this plan is \$5,583,000. Of the annual reservoir yield of 100,000 acre-feet, 43,800 acre-feet would be allocated to municipalities and districts of suburban character in Salt Lake Valley and the balance used to provide supplemental water to 27,200 acres now irrigated and a complete supply for 9,100 acres not yet irrigated. Construction costs for irrigation are estimated at \$51 to \$197 per acre with repayment ability adequate to

effect return of the costs in 40 years if interest-free funds are provided. Proximity to relatively large centers of population will result in high acre values for crop production. A power plant at the dam would cost \$791,000 additional. Its output would be largely seasonal, but income from the sale thereof is estimated sufficient to pay \$250,000 toward the cost of the dam after providing for interest at 4 per cent and return of investment in 50 years, besides effecting some reduction in power costs to districts pumping irrigation water.

Eventually reservoir yield would be increased to 135,000 acre-feet annually by means of a 5½-mile tunnel from Duchesne River to Provo River costing \$2,081,000. Canal enlargements and extensions for the use of the added water will cost \$1,667,000 to irrigate 9,100 acres of new lands unless better uses be then found for such water.

Ogden River division.—Surveys were continued and cost estimates prepared of the canals to serve lands north and south of Ogden Canyon. Plans and estimates were completed for reservoirs at the Skull Creek, Magpie, and Huntsville sites. Investigations were made of agricultural and economic features connected with the use of waters for irrigation, including a land classification and an inquiry into prevailing cost of water for lands now irrigated and into financial results of typical developed farms producing crops similar to crops anticipated for project lands. The report on this investigation is expected to be completed early in the coming fiscal year.

Moon Lake investigation.—The engineering report on this work was issued in October, 1931. Moon Lake Reservoir with a capacity of 30,000 acre-feet, obtained by raising a natural lake of that name 56 feet by means of an earth fill dam 85 feet high located 3,000 feet below the lake outlet, is estimated to cost \$1,178,000. Inflowing waters not needed to fill prior rights are estimated sufficient to refill the reservoir every year. The yield of the reservoir would provide a supplemental water supply for an area of roundly 30,000 acres now being irrigated from Uintah and Lake Fork Rivers in the vicinity of Myton and Roosevelt and producing general farm crops with alfalfa seed most important. Several short canals or extensions of existing canals, all of small capacity, will be necessary for efficient distribution of the stored water. Present irrigation charges are small as operations are simple and indebtedness is negligible. Repayment of storage costs in 40 years without interest results in additional charges within the limit of \$1.25 per acre annually, concluded in the economic report issued February, 1931, to be allowable.

Rush Lake investigation.—A report on this work was issued in September, 1931. Rush Lake is a terminal reservoir for a few intermittent streams originating in the Oquirrh and Stansbury Mountains, south of Great Salt Lake, from which it is separated by a porous bar of stream-washed materials. At high stages of the lake much water

escapes through the bar, but at low stages losses are practically limited to evaporation, soil borings showing an underlying impervious clay bed, except at the bar. Although seepage losses could be almost entirely eliminated by an earth dam across the lake a short distance above the bar, inflow to the lake in periods of depressed precipitation becomes too small to warrant development. At times the lake is dry for considerable periods.

Gooseberry Reservoir.—Progress on these investigations has practically marked time pending the results of stream-flow observations. Completion of the work is anticipated early in the next fiscal year.

Ephraim investigation.—This project contemplates the diversion of Beck and Seely Creeks, of the Colorado River watershed, to the Sevier River watershed to supplement the supply of irrigated lands in the vicinity of Ephraim. A tunnel of 7,100 feet, several miles of gathering canals at an elevation of 9,800 feet at the intake end, and about 10 miles of distributing canal at the outlet end of the tunnel will be required. A water-supply study has been started but will not be completed until later in 1932. Canal and tunnel surveys have been completed.

WASHINGTON

Burbank project.—A report on engineering features was submitted October 27, 1931, and on land classification and economics in December, 1931. The Burbank project ceased operation in 1928 after 20 years of struggling. The investigation was directed to rehabilitation of a part of the older project with the aid of power to be developed at the Prosser plant. On the selected area of 1,887 acres the typical soil is a loamy fine sand 2 feet in depth, merging quickly to a mass of boulders and coarse sand with little compaction. These soils are too sandy for general farming but will produce truck crops. An annual irrigation charge of \$7.50 per acre was concluded to be the maximum collectible. Construction work consisting principally of replacement of open ditches and deteriorated or destroyed pipe lines with concrete pipe and concrete lining, is estimated to cost \$250,000 or \$132 per acre. The pumping lift is 94 feet. Provided repayment of construction costs could be made in 40 years without interest and power would be made available from the Prosser plant at \$17.50 per kilowatt, the annual irrigation charge was estimated at \$11.22 or materially in excess of collectible amounts even though no payments were necessary for the use or purchase of pumping equipment in place and proposed to be used in the project considered. It is therefore concluded that this project is infeasible.

Oroville-Tonasket irrigation district.—The district comprises 7,000 acres of irrigable land, largely in orchards, receiving water from Similkameen River through 67 miles of canal, of which 43 miles are wood flume or wood pipe constructed mainly in 1915. The need for

major replacements, estimated to cost \$600,000, now coincides with the requirement for bond retirement of a debt of over \$100 per acre. Necessary assessments for operation and maintenance, and for interest on bonds have in recent years been \$13 to \$15 per acre and are considered to be all that can be collected. Rehabilitation of the project works necessitates refinancing with temporarily lowered fixed charges to the end that collectible amounts will enable the district to reconstruct its irrigation system along more permanent lines. A proposal by the State Legislature of Washington to lend the district \$450,000 at low interest rates was vetoed by the governor. The district has requested the use of reclamation funds. A report on this district is dated January, 1932.

Columbia Basin project.—A report on this project was issued January 7, 1932. The Columbia River Dam, located on that stream at the head of Grand Coulee, 450 feet high, and containing with appurtenant structures over 11,000,000 cubic yards of concrete, will raise the water level 355 feet to the river level at the international boundary, 150 miles upstream. The upper 80 feet of back water with a capacity of 5,000,000 acre-feet would be used to increase the low-water flow and enable more uniform power production. A power plant of 2,100,000 horsepower capacity would produce firm power equivalent to a continuous output of 800,000 kilowatts, and in addition, power for pumping the irrigation water during the flood season, largely with off-peak power. Pumps with a capacity of 16,000 second-feet operating at heads of 275 to 365 feet would raise water from the forebay of the river dam to a short canal supplying Grand Coulee Reservoir, which would be formed by two dams at the ends of the Coulee and would have a capacity of 329,000 acre-feet in the upper 15 feet of its depth. Water would be drawn from this reservoir for the entire irrigable area, estimated at 1,200,000 acres, including 219,000 acres within a 100-foot pumping lift from the main canals. All of the main canals and much of the lateral system, would be concrete lined. Construction cost of the Columbia River Dam and plant is estimated at \$168,366,000 and of the irrigation features, including the river pumping plant, at \$208,265,000. Assuming no taxes, 4 per cent interest on advances, repayment in 50 years following completion, and 15 years for absorption of power, sale of the firm power at 2.25 mills per kilowatt-hour and of the irrigation pumping power at \$1 per acre irrigated, will leave an annual surplus averaging nearly \$4,000,000 beginning with the fifteenth year after power is first produced. The accumulated surplus power revenue will, 40 years after the first irrigation, equal roughly one-half the total construction cost of the irrigation works for the entire project, and if so applied would leave only one-half the irrigation construction cost to be paid by the irrigator. With such a subsidy, annual irrigation charges under the reclamation law would be \$2.50 per acre for the first four years after water becomes

available, then \$4.59 per acre for four years, followed by 32 years with a charge of \$5.09 per acre. The permissible charge for a developed farm has been estimated at \$5.25 per acre per year.

Providing funds can be made available under the conditions outlined, feasibility of the project will be dependent on the cooperation of power consuming centers in Washington, northern Oregon, and northern Idaho, as delayed absorption of power increases the investment by reason of deficits in the development period and reduces the surplus available for the aid of irrigation development, which is the primary object of the project. Delay in irrigation development enhances feasibility in permitting larger surpluses to accumulate from power revenues by reason of delayed power-plant installation or in the alternative by the sale of power temporarily not needed for irrigation pumping.

WYOMING

Shoshone project extensions.—The report on these investigations was issued in September, 1931. For the remaining development the Canyon Canal, with a capacity of 1,200 second-feet and 3 miles long, will divert from Shoshone Reservoir 140 feet above the stream, leaving 75,000 acre-feet of storage unavailable and 382,000 acre-feet available. At the end of this canal, the Heart Mountain Canal with an initial capacity of 912 second-feet will cross Shoshone River and running northerly 28 miles will supply the lands of the Heart Mountain division, including the Chapman Bench, with a total irrigable area of 41,000 acres as determined by a land classification made in 1928. Because of excessive additional cost for its inclusion, principally on account of the 10 miles of siphon and tunnel required to reach the area, the Polecat Bench has been excluded from the project. The estimated construction cost for this division is \$142 per acre, including a pro rata share in the Canyon Canal, but exclusive of storage which is being paid for out of power revenues from the plant at the Shoshone Dam. From the end of the Canyon Canal the Oregon Basin Canal, with a capacity of 600 second-feet and 23 miles long, will supply the Oregon Basin Reservoir and a small irrigable area above the elevation of the reservoir outlet. The reservoir will have a usable capacity of 150,000 acre-feet between elevations 5,125 and 5,175 without dams or dikes, a tunnel outlet 3,600 feet long being required. Release from the reservoir into a tributary of Dry Creek and diversion therefrom by a series of laterals will provide water for 48,000 acres of irrigable new lands, as determined by a reconnaissance land classification made in 1930–31. The construction cost for these lands is estimated at \$115 per acre. A few miles west of Burlington, one of the Oregon Basin laterals leading southerly would be extended to the Greybull River, with a total length of 9 miles and a maximum capacity of 600 second-feet, to deliver a supplemental supply for the canals of the

Greybull irrigation district, containing 46,000 irrigable acres, as determined by a land classification made in 1930. The cost to the district of its share of costs of the Oregon Basin division works, together with necessary drainage to restore repayment ability to the seeped lands, is estimated at an average of \$49 per acre. Economic investigations have led to the conclusion that annual acre construction payments that might be expected under conditions pertaining in recent years are \$2.50 for Heart Mountain division, \$1.50 for the Oregon Basin division, and \$1.50 to \$2.50 for Greybull irrigation district lands.

North Platte River power investigations.—Drilling was completed at the Seminole and Kortess dam sites in Seminole Canyon. A maximum depth of nearly 50 feet to sound rock was encountered at the Seminole site, but it was impracticable to drill the westerly portion of the channel which is filled with large, hard, loose granite boulders. A greater depth may exist, although it is unlikely. At the Kortess site, depths of 28 to 30 feet to rock were found. Topographic surveys were completed of the canyon from Northgate dam site to Douglas Creek, of Seminole Canyon, and of Fremont Canyon below Pathfinder Dam. Designs and estimates were in course of preparation and the report is expected to be completed in the coming fiscal year.

Cost of secondary investigations, fiscal year 1932

	United States	States or others	Total
California:			
Sacramento-San Joaquin Valley	\$2,959.31		\$2,959.31
All-American Canal	3,521.04	\$3,521.04	7,042.08
Idaho:			
Twin Springs Reservoir	632.01		632.01
Salmon River diversion			(1)
Rathdrum Prairie project	23,389.58		23,389.58
Upper Snake River investigations	1,558.65		1,558.65
Montana:			
Musselshell River Basin	436.76	436.75	873.51
Tongue River investigations	160.18		160.18
Beaverhead River investigations	118.02		118.02
Victory irrigation district	85.02		85.02
Chinook division drainage		791.63	791.63
Nevada:			
Humboldt River investigations	1,451.46		1,451.46
Utah:			
Cache Valley project	4,158.63	4,158.64	8,317.27
Provo River division (Deer Creek Reservoir)	969.41	969.41	1,938.82
Ogden River division	1,830.51	1,830.50	3,661.01
Moon Lake investigations		561.92	561.92
Rush Lake investigation		18.89	18.89
Gooseberry Reservoir		282.30	282.30
Ephraim investigations		586.12	586.12
Washington:			
Burbank project	4,300.53		4,300.53
Oroville-Tonasket district	677.56		677.56
Columbia Basin, project	24,361.69		24,361.69
Roza division, Yakima project	6,727.91		6,727.91
Wyoming:			
Shoshone Project extensions	2,747.99		2,747.99
North Platte River power investigations	17,041.17		17,041.17
Greybull Valley	135.20	135.21	270.41
Experimental investigations	*6,871.81		*6,871.81
Totals	90,390.82	13,292.41	103,683.23

¹ Cost and expenditures included in financial statements for the Boise project.

* Contra.

COLORADO RIVER BASIN INVESTIGATIONS UNDER SECTION 15 OF THE BOULDER CANYON PROJECT ACT

Field work for the determination of irrigable areas west of Green River from Kendall to Big Piney in Wyoming was continued and completed late in 1931. In connection therewith tentative canal lines were surveyed for determination of feasible routes rather than construction cost. A reservoir site below Kendall was surveyed and a geological examination of the reservoir site and dam site conducted. In November, 1931, the entire organization was transferred to southwestern Arizona for work in the Gila Valley area. Topography obtained by the United States Geological Survey was extended to include all land below elevation 600, comprising slightly over 1,000,000 acres, and a classification of these lands with the aid of soil analyses was then made as to irrigability. This work was completed in May, 1932, as were a survey and estimate for a canal of 8,000 second-foot capacity between the upper and lower Parker damsites, and the placement of a number of monumented cross-section stations on the Colorado River between Hoover and Laguna Dams to enable observation of channel changes that may result with construction of the Hoover Dam. A canal survey was also made northerly from the Gila Valley around the southern end of the Chocolate and Trigo Mountains. In May, 1932, the organization was transferred northerly, one field party being stationed at Overton, Nev., to determine areas that might be irrigated by pumping from Boulder Canyon Reservoir, another being stationed at St. George, Utah, to investigate irrigation possibilities in southern Utah and northern Arizona, while others were stationed at Pinedale, Wyo., to commence investigation of the possibilities for the utilization of the eastern tributaries of Green River.

The cost of the investigation during the fiscal year was \$73,942 and the total cost to date \$78,871. The authorized expenditure under section 15 of the Boulder Canyon project act is \$250,000.

TABLES

RECLAMATION TABLE 1.—Consolidated financial statement, June 30, 1932

DEBIT SIDE

Construction account:		
Primary projects—		
Cost of irrigation works—		
Original construction.....	\$198,792,308.18	
Supplemental construction.....	12,447,462.25	
Value of works taken over.....	2,056,939.90	
Total construction cost.....		\$213,296,710.33
Operation and maintenance prior to public notice (net).....	2,774,923.62	
Operation and maintenance deficits and arrearages funded with construction.....	5,052,370.69	
Penalties on water-right charges funded with construction.....	1,370,675.05	
		9,197,969.36
		222,494,679.69
Less—Income items—		
Construction revenues.....	6,400,797.16	
Contributed funds.....	1,614,552.76	
Nonreimbursable appropriation (Rio Grande Dam).....	1,000,000.00	
		9,015,349.92
		213,479,329.77
Less—		
Abandoned works, nonreimbursable cost and charge-offs....	15,440,108.50	
		\$198,039,221.27
Balance payable.....		
Yuma auxiliary project—		
Cost of irrigation works.....	893,411.93	
Less: Construction revenues.....	1,545.47	
		891,866.46
Secondary projects and general investigations:		
Costs of surveys and investigations.....	2,829,920.80	
Less: Contributed funds.....	527,686.38	
		2,302,234.42
General offices' expense undistributed.....		19,983.00
Plant and equipment.....		590,374.36
Materials and supplies.....		351,187.87
Accounts receivable:		
Current accounts due.....	2,136,417.74	
Deferred accounts not due.....	155,349,887.15	
		157,486,304.89
Unadjusted debits: Disbursement vouchers in transit.....		2,785.38
Cash:		
Balance on hand—		
Reclamation fund.....	\$3,706,363.62	
Yuma auxiliary fund.....	159,417.63	
Special funds.....	118,745.08	
		3,984,526.33
In special deposit and in transit.....		62,290.31
		4,046,816.64
Total debits.....		363,700,808.29

CREDIT SIDE

Security for repayment of cost of irrigation works:		
Contracted construction repayments.....	198,300,846.93	
Yuma auxiliary contracted repayments.....	604,932.94	
		198,905,839.87
Current accounts payable.....		1,034,187.49
Deferred and contingent obligations.....		915,318.37
Reserves and undistributed profits.....		7,043,403.77
Operation and maintenance results, surplus.....		566,062.94
Undistributed clearing cost accounts.....		20,716.30
Unadjusted credits: Collection vouchers in transit.....		25.00

¹ Contra.

Government aid for reclamation of arid lands:		
Reclamation fund.....		\$153, 659, 346. 20
Special funds—		
Increase of compensation.....		2, 797, 960. 33
Rio Grande Dam.....		1, 000, 000. 00
Wind River Indian (Riverton).....		359, 176. 04
Judgments, United States courts.....		602, 814. 38
Drainage and cut-over lands.....		99, 815. 08
General investigations, 1923-Dec. 31, 1924.....		266, 352. 66
Arid, semiarid, swamp, and cut-over timberlands.....		35, 923. 75
Columbia Basin irrigation project.....		11, 634. 28
Colorado River levee system.....		400, 000. 00
		<u>159, 233, 022. 72</u>
Advances to reclamation fund—		
Bond loan.....	\$20, 000, 000. 00	
Less: Amount repaid.....	<u>10, 000, 000. 00</u>	
		10, 000, 000. 00
Treasury loan (act of Mar. 4, 1931).....	<u>5, 000, 000. 00</u>	
		<u>15, 000, 000. 00</u>
		174, 233, 022. 72
Less: Nonreimbursable appropriation, Rio Grande Dam.....		<u>1, 000, 000. 00</u>
		173, 233, 022. 72
Less: Impairment of funds—		
Abandoned works.....	\$1, 349, 994. 64	
Nonreimbursable cost.....	665, 060. 28	
Operation and maintenance cost uncollectible.....	453, 272. 39	
Charge-offs, act of May 25, 1926.....	14, 465, 007. 96	
Washington office cost since Dec. 5, 1924.....	1, 079, 781. 42	
Attendance at meetings cost.....	1, 815. 90	
Giving information to settlers.....	495. 25	
Prepaid Civil Service retirement fund.....	<u>2, 340. 33</u>	
		<u>18, 017, 768. 17</u>
		\$155, 215, 254. 55
Total credits.....		<u>363, 700, 808. 29</u>

RECLAMATION TABLE 2.—*Available funds, expenditures, and balances, fiscal year 1932*

Items	Funds				
	Reclamation	Yuma auxiliary	Arid, semiarid, swamp, and cut-over timberlands	Colorado River levee system	Air navigation facilities (commerce)
Balance on hand July 1, 1931.....	\$4, 684, 674. 15	\$157, 244. 67	\$9, 069. 56	\$174, 512. 72	\$406. 87
Receipts:					
Proceeds from sale of public lands.....	430, 444. 51	-----	-----	-----	-----
Proceeds from oil leasing act.....	1, 429, 272. 09	-----	-----	-----	-----
Proceeds from potassium royalties.....	11, 245. 22	-----	-----	-----	-----
Proceeds from Federal power licenses.....	94, 299. 66	-----	-----	-----	-----
From project collections.....	3, 434, 053. 46	23, 616. 85	-----	-----	-----
From General Treasury.....	3, 000, 000. 00	-----	¹ 9, 069. 56	-----	¹ 406. 87
Total.....	13, 083, 989. 09	180, 861. 52	-----	174, 512. 72	-----
Expenditures: Disbursements.....	9, 377, 625. 47	21, 443. 89	-----	55, 767. 64	-----
Balance on hand June 30, 1932.....	3, 706, 363. 62	159, 417. 63	-----	118, 745. 08	-----

¹ Contra.

RECLAMATION TABLE 3.—*Accretions to reclamation fund, by States*

States	Sale of public lands		Proceeds from oil leasing act		Potassium royalties and rentals ¹	Total to June 30, 1932
	Fiscal year 1932	To June 30, 1932	Fiscal year 1932	To June 30, 1932		
Alabama.....			\$4, 751. 07	\$71, 692. 16		\$71, 692. 16
Arizona.....			2. 53	53. 18		2, 578, 009. 15
California.....	\$54, 960. 10	\$2, 577, 955. 97	615, 996. 36	8, 664, 298. 27	\$91, 274. 34	16, 795, 224. 41
Colorado.....	56, 922. 24	8, 039, 651. 80	34, 487. 12	402, 071. 89		10, 585, 543. 70
Idaho.....	39, 686. 01	10, 183, 471. 81	2, 519. 13	11, 817. 17		6, 976, 652. 17
Kansas.....	² 4, 664. 72	6, 964, 835. 00				1, 032, 764. 48
Louisiana.....		1, 032, 764. 48	2, 262. 81	24, 615. 75		24, 615. 75
Montana.....	46, 801. 36	15, 223, 877. 79	32, 301. 24	995, 406. 30		16, 219, 284. 09
Nebraska.....	439. 04	2, 095, 367. 55				2, 095, 367. 55
Nevada.....	7, 901. 84	1, 015, 374. 44	1, 184. 27	4, 733. 37		1, 020, 107. 81
New Mexico.....	93, 609. 29	6, 432, 013. 50	55, 918. 76	263, 589. 67		6, 695, 603. 17
North Dakota.....	1, 887. 36	12, 219, 283. 47	9, 919. 92	89, 241. 30		12, 308, 524. 77
Oklahoma.....	282. 00	5, 926, 670. 90				5, 926, 670. 90
Oregon.....	9, 005. 94	11, 927, 195. 50	10. 25	10. 25		11, 927, 205. 75
South Dakota.....	3, 100. 44	7, 724, 091. 61	198. 23	885. 86		7, 724, 977. 47
Utah.....	22, 538. 15	4, 174, 951. 98	39, 474. 83	309, 784. 36		4, 484, 736. 34
Washington.....	14, 730. 30	7, 434, 211. 30	5, 231. 92	22, 333. 91		7, 456, 545. 21
Wyoming.....	83, 245. 16	8, 416, 555. 89	625, 013. 65	30, 953, 541. 99		39, 370, 097. 88
Total.....	430, 444. 51	111, 388, 272. 99	1, 429, 272. 09	41, 814, 075. 43	91, 274. 34	153, 293, 622. 76
Proceeds, Federal water-power licenses.....						³ 365, 723. 44
Grand total.....						153, 659, 346. 20

¹ Proceeds for fiscal year, \$11,245.22.² Contra.³ Proceeds for fiscal year, \$94,299.66.

RECLAMATION TABLE 5.—Consolidated statement, by projects, of operation and maintenance cost, operation and maintenance returns and other credits, and results, calendar year 1931

State and project	Cost	Operation and maintenance returns				Other credits ¹	Results: Excess (+) or deficit (—)
		Charges contracted	Penalties	Discounts (contra)	Miscellaneous revenues		
Arizona: Yuma auxiliary.....	\$22,939.39	\$30,501.64	—	—	\$1,244.90	—	+88,807.15
Arizona-California: Yuma.....	288,483.97	179,217.15	\$1,138.71	\$574.76	10,567.20	—	-98,135.67
California: Orland.....	38,222.53	38,201.16	360.47	983.63	332.04	—	-312.49
Colorado:							
Grand Valley.....	44,180.36	46,875.00	—	—	720.00	—	+3,414.64
Uncompaggre.....	116,208.12	2 675.43	—	—	2,733.06	—	-114,150.49
Idaho:							
Boise.....	25,503.70	15,110.36	—	—	—	—	-10,393.34
Minidoka.....	75,027.39	66,041.96	—	—	12,597.55	2 \$108.12	+3,504.00
Minidoka-Gooding.....	22,748.72	1,087.05	—	—	359.45	—	-21,302.22
Montana:							
Milk River.....	43,492.61	47,440.47	—	102.75	415.70	—	+4,260.81
Sun River.....	2,569.39	2,619.47	—	—	2 115.27	2 17.39	-22.58
Montana-North Dakota: Lower Yellowstone.....	56,917.65	29,055.89	—	—	1,525.97	—	-26,335.79
Nebraska-Wyoming: North Platte.....	35,419.37	25,004.00	—	—	2,512.02	—	-7,903.35
New Mexico: Carlsbad.....	49,118.71	59,137.47	1,070.35	563.16	376.27	—	+10,952.22
New Mexico-Texas: Rio Grande.....	373,854.25	355,412.00	2,122.73	—	16,319.52	—	+4,071.03
Oregon: Umatilla.....	3,410.63	7,451.44	—	—	30.22	—	+8,194.20
Oregon-California: Klamath.....	88,996.63	56,753.26	3.17	—	40,434.40	—	+2,169.86
South Dakota: Belle Fourche.....	68,947.95	67,500.00	—	—	3,617.81	—	—
Washington:							
Yakima.....	255,971.20	246,191.18	5,142.91	2,521.15	6,377.33	93.74	-687.19
Yakima-Kititias.....	52,245.96	54,234.00	.27	—	—	8,783.97	+10,772.28
Wyoming:							
Riverton.....	67,787.63	—	—	—	9,398.26	58,389.37	—
Shoshone.....	2,508.02	3,091.96	—	2 1.81	—	154,986.76	+155,572.51
Total.....	1,734,494.18	1,330,300.03	9,838.61	4,743.64	109,446.43	222,128.333	-67,524.42

¹ Amounts to be repaid with construction and charge-offs under act of May 25, 1926 (44 Stat. 636).² Contra.

RECLAMATION TABLE 6.—Consolidated statement, by projects, of operation and maintenance cost, operation and maintenance returns and other credits, and results to December 31, 1931

REPORT OF THE COMMISSIONER OF RECLAMATION

83

State and project	Cost	Operation and maintenance returns				Other credits		Results: Excess (+) or deficit (—)
		Charges con- tracted	Penalties	Discounts (contra)	Miscellane- ous revenues	Deficits un- collectible	Amounts to be repaid with con- struction	
Arizona: Yuma auxiliary.....	\$332, 136. 11	\$394, 625. 04	\$537. 74	\$1, 106. 79	\$8, 326. 49	---	---	+\$70, 246. 37
Arizona-California: Yuma.....	4, 679, 496. 22	4, 637, 890. 23	99, 438. 37	58, 842. 16	197, 083. 02	---	\$2, 921. 96	+198, 995. 20
California: Orland.....	495, 554. 79	526, 323. 49	2, 203. 99	21, 670. 88	3, 431. 58	---	---	+14, 733. 39
Colorado:								
Grand Valley.....	192, 480. 07	206, 750. 00	---	---	2, 762. 00	---	---	+17, 031. 93
Idaho:								
Uncompahgre.....	1, 190, 155. 31	1, 198, 344. 40	11, 236. 87	11, 602. 77	24, 461. 56	---	---	+32, 284. 75
Boise.....								
King Hill.....	2, 814, 742. 12	2, 124, 827. 77	69, 709. 20	52, 649. 72	111, 044. 96	---	601, 070. 37	+39, 320. 46
Minidoka.....	156, 734. 25	60, 711. 27	1, 519. 05	1, 519. 05	342. 89	---	97, 199. 14	---
Minidoka-Gooding.....	2, 293, 083. 26	1, 866, 239. 32	29, 463. 35	22, 341. 74	127, 782. 96	---	266, 497. 42	+4, 588. 05
Montana:								
Huntley.....	1, 014, 941. 03	557, 805. 45	15, 712. 18	10, 449. 84	11, 586. 91	1 \$84, 354. 00	358, 985. 39	---
Milk River.....	277, 263. 30	202, 440. 71	---	1, 662. 25	5, 457. 89	---	100, 393. 62	+53. 06
Sun River.....	319, 276. 88	161, 590. 93	6, 360. 24	3, 468. 33	29, 626. 27	1 34, 148. 00	90, 527. 24	+29, 366. 67
Montana-North Dakota: Lower Yellowstone.....	1, 348, 914. 52	347, 313. 53	2 59	4 63	135, 751. 13	---	861, 460. 22	---
Nebraska-Wyoming: North Platte.....	2 803, 906. 36	1 839, 903. 22	27, 304. 03	35, 811. 80	33, 588. 43	---	1, 043, 085. 97	---
Nevada: Newlands.....	1 453, 490. 54	1 188, 795. 72	28, 660. 62	24, 970. 08	26, 012. 61	---	15, 876. 45	+104, 163. 49
New Mexico: Carlsbad.....	912 592. 21	874, 468. 99	30, 235. 90	17, 150. 90	26, 146. 83	1 211, 292. 00	15, 876. 45	---
New Mexico-Texas: Rio Grande.....	3 454, 325. 62	3 382, 714. 77	10, 719. 65	4 486. 44	65, 377. 64	---	1, 934. 00	+3, 042. 61
North Dakota:								
Burford-Trenton.....	74 781. 07	2 317. 41	---	---	10. 00	2 72, 453. 66	---	---
Williston.....	904, 662. 04	34, 042. 75	45. 81	---	489, 754. 75	2 \$80, 818. 73	---	---
Oregon: Umatilla.....	694, 930. 66	376, 558. 71	7, 697. 84	3, 314. 38	39, 867. 76	1 91, 083. 55	197, 132. 52	---
Oregon-California: Klamath.....	1, 284, 477. 41	1, 175, 670. 84	3, 621. 15	4, 942. 27	158, 945. 37	---	3, 712. 03	+14, 095. 14
South Dakota: Belle Fourche.....	1 613, 288. 24	884, 808. 18	29, 196. 35	9, 240. 72	29, 592. 88	1 119, 606. 00	570, 194. 90	+52, 529. 71
Utah: Strawberry Valley.....	437, 856. 39	376, 880. 88	10, 196. 17	11, 588. 67	20, 400. 30	---	42, 237. 71	+10, 869. 35
Washington:								
Okanogan.....	649, 647. 22	371, 441. 72	1, 451. 15	397. 47	70, 485. 39	1 181, 472. 06	25, 194. 37	---
Yakima.....	4 647, 349. 99	4 446, 934. 25	91, 361. 41	57, 455. 73	137, 113. 82	---	74, 852. 28	+45, 456. 04
Yakima-Kittitas.....	80, 782. 74	73, 986. 81	0. 27	---	---	---	8, 783. 97	+1, 988. 31
Wyoming:								
Riverton.....	67, 787. 63	---	---	---	9, 398. 26	---	58, 389. 37	---
Shoshone.....	915, 934. 14	543, 875. 69	13, 614. 85	11, 051. 05	41, 392. 57	1 38, 036. 00	371, 095. 48	+81, 029. 40
Total.....	35, 103, 338. 84	27, 859, 106. 51	488, 829. 73	365, 997. 67	1, 806, 103. 72	1, 210, 263. 80	4, 791, 544. 41	+686, 511. 66

* Projects abandoned.

¹ Charge-offs under act of May 25, 1926 (41 Stat. 636).

RECLAMATION TABLE 7.—*Accounts receivable, construction water-right charges (including contributed funds)*

State and project	Due		Collected			Uncollect- ed June 30, 1932
	Fiscal year 1932	To June 30, 1932	Cash		Other cred- its to June 30, 1932	
			Fiscal year 1932	To June 30, 1932		
Arizona:						
Salt River		\$7, 116, 215. 41		\$7, 116, 215. 41		
Yuma auxiliary	\$3, 494. 51	591, 757. 97	\$2, 925. 57	587, 903. 66	\$1, 584. 05	\$2, 270. 26
Arizona-California: Yuma	¹ 56, 198. 58	3, 868, 705. 61	8, 236. 27	3, 347, 141. 37	450, 299. 20	71, 265. 04
California: Orland	66, 594. 39	834, 064. 58	23, 238. 08	763, 308. 81		70, 755. 77
Colorado:						
Grand Valley	128, 710. 52	288, 930. 45	123, 492. 44	202, 729. 94	58, 035. 71	28, 164. 80
Uncompahgre	¹ 336, 601. 61	490, 216. 21	¹ 469. 06	427, 351. 16	62, 865. 05	
Idaho:						
Boise	252, 235. 06	4, 041, 524. 34	207, 956. 51	3, 966, 374. 03	27, 078. 59	48, 071. 72
King Hill	16, 250. 00	66, 825. 66		8, 025. 66		58, 800. 00
Minidoka	305, 666. 97	8, 274, 138. 76	167, 672. 93	7, 703, 257. 46	433, 077. 96	137, 803. 34
Minidoka-Gooding	218. 12	280, 798. 48	218. 12	280, 798. 48		
Montana:						
Huntley	9, 129. 53	551, 231. 66	5, 363. 95	461, 942. 46	89, 091. 24	197. 96
Milk River	3, 892. 16	6, 894. 92		3, 002. 76		3, 892. 16
Sun River	1, 906. 73	204, 246. 78	523. 76	200, 942. 61	2, 199. 53	1, 104. 64
Montana-North Dakota:						
Lower Yellowstone	4, 341. 02	288, 352. 53	8, 143. 40	288, 352. 53		
Nebraska-Wyoming: North						
Platte	287, 821. 64	3, 352, 968. 95	20, 765. 56	2, 758, 996. 91	528, 181. 27	65, 790. 77
Nevada: Newlands	79, 106. 57	1, 132, 397. 65	57, 259. 17	1, 072, 017. 92	55, 965. 98	4, 413. 75
New Mexico: Carlsbad	68, 040. 87	996, 262. 56	9, 523. 92	894, 935. 71	81. 25	101, 245. 60
New Mexico-Texas: Rio						
Grande	181, 031. 33	3, 494, 757. 33	178, 800. 30	3, 141, 777. 81	311, 671. 64	41, 307. 88
Oregon:						
Baker		5, 000. 00		5, 000. 00		
Umatilla	32, 962. 43	516, 387. 28	883. 24	397, 566. 01	4, 803. 91	114, 017. 36
Vale		5, 000. 00		5, 000. 00		
Oregon-California: Klamath	¹ 39, 091. 85	1, 096, 520. 77	12, 028. 01	1, 074, 223. 85	956. 15	21, 340. 77
Oregon-Idaho: Owyhee		4, 354. 61		4, 354. 61		
South Dakota: Belle Four- che	¹ 22, 244. 56	622, 383. 71	¹ 24, 007. 61	546, 075. 54	76, 308. 17	
Utah:						
Salt Lake Basin		44, 756. 77		44, 756. 77		
Strawberry Valley	109, 860. 23	1, 320, 306. 14	60, 037. 72	1, 249, 270. 73	8, 689. 50	62, 345. 91
Washington:						
Okanogan	10, 425. 94	151, 643. 33	2, 154. 71	133, 372. 10		18, 271. 23
Yakima	412, 617. 60	7, 009, 857. 70	194, 644. 53	6, 552, 860. 60	36, 363. 75	420, 633. 35
Yakima-Kittitas		1, 000. 00		1, 000. 00		
Wyoming: Shoshone	8, 231. 85	832, 306. 42	5, 176. 85	825, 032. 53	6, 282. 81	991. 08
Total	1, 528, 400. 87	47, 489, 806. 58	1, 064, 568. 37	44, 063, 587. 43	² 2, 153, 535. 76	1, 272, 683. 39
Paid in advance of due dates			239, 490. 23	385, 240. 36	³ 192, 017. 67	
Refunds				98, 591. 20	3, 212. 84	
Total collections			1, 204, 058. 60	44, 547, 418. 99		

¹ Contra.² Other credits for fiscal year \$393,308.11.³ Decrease for fiscal year, \$90,128.18.

RECLAMATION TABLE 8.—*Accounts receivable, operation and maintenance charges (after public notice)*

State and project	Due		Collected		Other credits to June 30, 1932	Uncollected June 30, 1932
	Fiscal year 1932	To June 30, 1932	Cash			
			Fiscal year 1932	To June 30, 1932		
Arizona: Yuma auxiliary-----	\$28,548.02	\$416,722.80	\$24,305.57	\$393,237.02	\$13,359.25	\$10,126.53
Arizona-California: Yuma-----	203,119.85	3,440,785.17	183,947.62	3,248,984.92	162,149.94	29,650.31
California: Orland-----	38,199.06	526,321.39	28,287.30	480,385.14	21,671.69	24,264.56
Colorado:						
Grand Valley-----	45,000.00	240,500.00	39,000.00	229,500.00		11,000.00
Uncompahgre-----	193,316.89	1,019,082.18	27,452.37	988,208.28	30,873.90	
Idaho:						
Boise-----	15,282.28	2,140,110.05	18,239.47	2,081,748.87	52,649.72	5,711.46
King Hill-----		60,711.27		59,192.22	1,519.05	
Minidoka-----	61,915.47	1,928,108.03	55,075.91	1,837,416.90	83,849.62	6,841.51
Minidoka-Gooding-----	1,087.05	1,844.43	1,087.05	1,844.43		
Montana:						
Huntley-----		554,787.34		543,594.31	11,193.03	
Milk River-----	48,129.72	219,622.63	37,299.22	201,144.51	1,662.25	16,815.87
Sun River-----	4,950.00	164,140.93	4,981.82	159,873.71	4,117.22	150.00
Montana-North Dakota:						
Lower Yellowstone-----	13,192.63	339,523.28	13,192.63	339,518.65	4.63	
Nebraska-Wyoming: North Platte-----	20,739.75	1,860,642.97	17,673.53	1,792,078.09	61,622.07	6,942.81
Nevada: Newlands-----	7,209.55	1,174,581.57	7,209.55	1,135,901.55	38,680.02	
New Mexico: Carlsbad-----	59,187.47	874,468.99	15,695.43	782,932.96	17,459.07	74,076.96
New Mexico-Texas: Rio Grande-----	371,602.92	3,288,886.47	247,456.91	2,936,238.77	166,265.29	186,382.41
North Dakota:						
Buford-Trenton-----		2,317.41		2,317.41		
Williston-----		34,042.75		34,042.75		
Oregon: Umatilla-----	6,767.27	376,558.71	1,105.37	366,140.77	7,535.94	2,882.00
Oregon-California: Klamath-----	21,775.75	1,136,811.04	58,914.87	1,102,159.09	30,536.22	4,115.73
South Dakota: Belle Fourche-----	63,700.00	948,508.18	63,700.00	939,132.19	9,375.99	
Utah: Strawberry Valley-----	5.40	376,880.88	5.40	365,022.21	11,858.67	
Washington:						
Okanogan-----		371,441.72		368,788.67	2,653.05	
Yakima-----	261,973.83	4,543,726.01	175,972.59	4,282,036.01	60,083.30	201,606.70
Yakima-Kittitas-----	55,097.80	94,203.61	55,097.80	94,203.61		
Wyoming: Shoshone-----	2,246.16	546,235.71	1,707.35	521,494.69	23,705.43	1,035.59
Total-----	1,236,413.09	26,681,565.52	1,077,407.76	25,287,137.73	282,825.35	581,602.44
Paid in advance of due dates-----			19,541.85	35,382.02	16.53	
Penalties and interest-----			9,453.64	478,563.20	18,900.84	46.14
Refunds-----			3,345.00	25,680.48	156.69	
Total collections-----			1,070,664.55	25,826,763.43		

¹ Contra.² Other credits for fiscal year, \$80,473.29.³ Decrease for fiscal year \$15,539.49.

RECLAMATION TABLE 9.—*Accounts receivable, rental of irrigation water*

State and project	Due		Collected		Other credits to June 30, 1932	Uncollected June 30, 1932
	Fiscal year 1932	To June 30, 1932	Cash			
			Fiscal year 1932	To June 30, 1932		
Arizona:						
Salt River.....		\$2, 246, 726. 01		\$2, 246, 726. 01		
Yuma auxiliary.....	\$650. 70	9, 371. 49	\$1, 499. 90	9, 371. 49		
Arizona-California: Yuma.....	9, 713. 25	519, 072. 98	9, 422. 39	505, 185. 07	\$12, 654. 19	\$1, 233. 72
California: Orland.....		121, 437. 30		121, 437. 30		
Colorado:						
Grand Valley.....	10, 900. 22	479, 221. 43	10, 000. 22	471, 820. 81	6, 500. 67	900. 00
Uncompahgre.....	4, 788. 20	1, 219, 219. 31	13, 571. 28	1, 217, 682. 35		1, 536. 96
Idaho:						
Boise.....	8, 050. 00	773, 838. 57	8, 050. 00	769, 118. 07	4, 720. 50	
Minidoka.....	113, 492. 72	530, 240. 95	104, 431. 68	516, 389. 44	3, 321. 51	10, 530. 00
Montana:						
Huntley.....	398. 92	10, 252. 01	407. 42	10, 252. 01		
Milk River.....	2, 766. 44	237, 761. 09	1, 154. 33	226, 299. 96	1, 208. 14	10, 252. 99
Sun River.....	101. 39	132, 105. 09	512. 02	129, 093. 16	1, 366. 62	1, 645. 31
Montana-North Dakota: Lower Yellowstone.....	2, 089. 55	134, 687. 30	2, 089. 55	134, 687. 30		
Nebraska-Wyoming: North Platte.....	2, 907. 50	339, 916. 04	2, 898. 50	339, 897. 04	10. 00	9. 00
Nevada: Newlands.....	4. 32	28, 291. 16	4. 32	22, 114. 31	6, 176. 85	
New Mexico:						
Carlsbad.....	213. 58	39, 075. 84	213. 58	39, 026. 73		49. 11
Hondo.....		9, 129. 70		9, 129. 70		
New Mexico-Texas: Rio Grande.....	34, 565. 80	1, 466, 414. 61	16, 228. 84	1, 419, 573. 21		46, 841. 40
North Dakota:						
Buford-Trenton.....		31. 75		31. 75		
Williston.....		2, 117. 28		2, 117. 28		
Oregon:						
Umatilla.....	4, 474. 20	93, 128. 82	4, 474. 20	66, 852. 02		26, 276. 80
Vale.....	5, 732. 00	11, 548. 42	4, 785. 40	10, 022. 32		1, 526. 10
Oregon-California: Klamath.....	43, 817. 08	241, 327. 16	43, 089. 88	237, 931. 33	25. 00	3, 370. 83
South Dakota: Belle Fourche.....	354. 18	8, 704. 82	354. 18	8, 687. 02	17. 80	
Utah: Strawberry Valley.....		17, 596. 13		17, 596. 13		
Washington:						
Okanogan.....		110, 645. 28		108, 061. 09	2, 584. 19	
Yakima.....	11, 102. 70	176, 589. 75	1, 704. 35	166, 946. 30		9, 643. 45
Wyoming:						
Riverton.....	2, 869. 85	11, 500. 93	1, 658. 44	9, 453. 51	2, 007. 97	39. 45
Shoshone.....	7, 724. 05	63, 438. 77	6, 976. 94	62, 346. 42	198. 72	893. 63
Total.....	257, 140. 25	9, 033, 390. 04	233, 527. 42	8, 877, 849. 13	40, 792. 16	114, 748. 75

¹ Contra.² Other credits for fiscal year, decrease of \$11,868. 08.

RECLAMATION TABLE 10.—*Voucher transactions, all funds, and net investment as of June 30, 1932*

Fund	Expenditures		Collections		Net investment	
	Fiscal year 1932	To June 30, 1932	Fiscal year 1932	To June 30, 1932	Fiscal year 1932	To June 30, 1932
Reclamation fund.....	\$9, 377, 625. 47	\$267, 393, 755. 90	\$3, 434, 053. 46	\$102, 440, 773. 32	\$5, 943, 572. 01	\$164, 952, 982. 58
Increase of compensation (net).....	2, 797, 960. 33	2, 797, 960. 33				2, 797, 960. 33
Judgments, United States courts.....		602, 814. 38				602, 814. 38
Rio Grande Dam appropriation (net).....		1, 000, 000. 00				1, 000, 000. 00
Wind River Indian, Riverton (net).....		359, 176. 04				359, 176. 04
General investigations, Reclamation Service, 1923-24 (net).....		266, 352. 66				266, 352. 66
Yuma auxiliary.....		864, 308. 53				1, 189, 417. 63
Drainage and cut-over (net).....	21, 443. 89	99, 813. 08	23, 616. 85	1, 023, 726. 16	1 2, 172. 90	99, 813. 08
Arid, semiarid, swamp, and cut-over timberlands (net).....		35, 923. 75				35, 923. 75
Columbia Basin irrigation project (net).....		11, 634. 28				11, 634. 28
Colorado River levee system (net).....		281, 254. 92				281, 254. 92
Air navigation facilities (commerce) (net).....	55, 767. 64				55, 767. 64	
	1 1, 813. 13				1 1, 813. 13	
Total.....	9, 453, 023. 87	273, 712, 995. 87	3, 457, 670. 31	103, 464, 499. 48	5, 995, 353. 56	170, 248, 496. 39

1 Contra.

RECLAMATION TABLE 11.—*Financial statement, Boulder Canyon project, June 30, 1932*

ASSETS AND OTHER DEBITS

I. INVESTMENTS

102. Fixed capital under construction	\$20, 140, 027. 70
103. Other physical properties.....	1, 145, 444. 04
104. Investigations—Colorado River Basin.....	78, 870. 56
105. Other capital expenditures—interest during construction.....	380, 661. 50
Total investments.....	\$21, 745, 003. 80

II. CURRENT AND ACCRUED ASSETS

121. Treasury cash:	
For advances to Colorado River Dam fund.....	12, 895, 525. 20
Colorado River Dam fund.....	9, 691. 13
Collections in transit.....	2, 121. 44
Total Treasury cash.....	12, 907, 337. 77
122. Special fiscal agents' cash.....	55, 585. 95
123. Special deposits.....	629. 25
124. Accounts receivable.....	55, 824. 32
Total current and accrued assets.....	13, 019, 377. 29

IV. DEFERRED AND UNADJUSTED DEBITS

141. Clearing and apportionment accounts.....	10, 934. 60
142. Reimbursable operations.....	*1, 415. 40
143. Field cost adjustments.....	610. 41
145. Jobbing accounts.....	116. 38
171. Unadjusted debits.....	20, 163. 30
Total deferred and unadjusted debits.....	30, 409. 29
Total assets and other debits.....	34, 794, 790. 38

LIABILITIES AND OTHER CREDITS

VII. CAPITAL AND LONG-TERM LIABILITY

205.1. Long-term liability—United States Treasury authorized appropriation.....	165, 000, 000. 00
161. Less: Authorized but not appropriated.....	133, 340, 000. 00
Total long-term liability—	
205.2. Appropriated but not advanced.....	12, 895, 525. 20
205.3. Appropriated and advanced.....	18, 764, 474. 80
	31, 660, 000. 00

VIII. CURRENT AND ACCRUED LIABILITIES

211. Audited accounts payable:	
211.1. Contractor's earnings—current.....	809, 865. 98
211.11. Contractors' earnings—holdback.....	1, 635, 207. 91
211.2. Labor.....	23, 640. 11
211.3. Purchases.....	95, 077. 09
211.4. Freight and express.....	105, 898. 92
211.5. Passenger fares.....	1, 966. 77
211.6. Rights of way.....	26, 063. 35
211.9. Miscellaneous.....	1, 321. 00
Total audited accounts payable.....	2, 699, 041. 13
214. Matured interest.....	355, 029. 22
220. Consumers' meter deposits.....	90. 00
Total current and accrued liabilities.....	3, 054, 161. 05

XII. DEFERRED CREDITS

223. Special deposits.....	629. 25
225. Revenues during construction—unapplied.....	15, 639. 95
Total deferred credits.....	16, 269. 20

XIII. MISCELLANEOUS CREDIT ITEMS

231. Unadjusted credits.....	3, 721. 04
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XVII. UNAPPROPRIATED SURPLUS

401. Operating revenues (credit).....	461, 892. 94
402. Operating expenses (debit).....	401, 253. 85
	60, 639. 09
Total liabilities and other credits.....	34, 794, 790. 38

RECLAMATION TABLE 12.—*Appropriation and cash statement, Boulder Canyon project, June 30, 1932*

TREASURY CASH	
Appropriations:	
Act of July 3, 1930—Warrant No. 7.....	\$10,660,000.00
Act of Feb. 14, 1931—Warrant No. 80½.....	15,000,000.00
Act of Apr. 22, 1932—Warrant No. 140.....	6,000,000.00
Total appropriation.....	31,660,000.00
Advanced to Colorado River Dam fund.....	18,764,474.80
121,11. Balance of appropriation—funds not advanced.....	\$12,895,525.20
Colorado River Dam fund:	
Advanced from appropriation to Colorado River Dam fund.....	18,764,474.80
Collections deposited in Colorado River Dam fund.....	23,651.78
Total advances and collections.....	18,788,126.58
Disbursements direct from fund.....	1,581,696.10
Advances to special fiscal agents.....	17,196,739.35
Total withdrawals from fund.....	18,778,435.45
121,21. Balance in Colorado River Dam fund.....	9,691.13
121,31. Repay collections in transit to Colorado River Dam fund.....	5.13
121,41. Miscellaneous collections in transit to Colorado River Dam fund.....	2,116.31
Total Treasury cash.....	12,907,337.77
SPECIAL FISCAL AGENTS' CASH	
Advances to fiscal agents.....	17,196,739.35
Disbursements by fiscal agents.....	17,142,322.12
Fiscal agents' checking balance.....	54,417.23
Collections by fiscal agents.....	26,941.94
Collections deposited.....	25,773.22
Collections not deposited.....	1,168.72
Special fiscal agents' cash balance.....	55,585.95

RECLAMATION TABLE 13.—*Capital investment, Boulder Canyon project, June 30, 1932*

Physical feature No.	Features	Total
102. FIXED CAPITAL UNDER CONSTRUCTION		
I. FLOOD CONTROL, STORAGE, AND IRRIGATION CAPITAL		
101	Reservoir area:	
101.01	Lands, mining claims.....	\$17,860.78
101.02	Lands, agricultural.....	277,529.20
	Subtotal.....	295,389.98
102.01	Surveys and testing.....	116,055.19
104.01	Stripping canyon walls.....	72,620.04
105	Diversion works:	24.16
105.01	Upstream cofferdam.....	3,326,311.81
105.04	Diversion tunnel No. 1, outer Nevada.....	814,038.90
105.05	Portals, tunnel No. 1, outer Nevada.....	3,333,820.88
105.06	Diversion tunnel No. 2, inner Nevada.....	146,469.58
105.07	Portals, tunnel No. 2, inner Nevada.....	3,028,840.71
105.08	Diversion tunnel No. 3, inner Arizona.....	211,528.43
105.09	Portals, tunnel No. 3, inner Arizona.....	3,499,349.47
105.10	Diversion tunnel No. 4, outer Arizona.....	196,817.92
105.11	Portals, tunnel No. 4, outer Arizona.....	
	Subtotal.....	14,557,201.86
106	Hoover Dam—Structure.....	133,461.50
107	Spillways:	
107.01	Nevada spillway, open cut.....	675,659.55
107.02	Nevada spillway, tunnel.....	38,103.00
107.04	Arizona spillway, open cut.....	388,054.31
107.05	Arizona spillway, tunnel.....	21,082.78
	Subtotal.....	1,122,899.64

RECLAMATION TABLE 13.—*Capital investment, Boulder Canyon project, June 30, 1932—Continued*

Physical feature No.	Features	Total
108	Nevada outlet works:	
108.01	Intake towers.....	\$156,400.11
108.02	Penstock tunnels.....	2,218.03
108.04	Diversion tunnel No. 1, plug.....	71,232.36
108.05	Diversion tunnel No. 2, plug.....	87,230.37
108.12	Shafts and galleries.....	7,621.98
	Subtotal.....	324,702.85
109	Arizona outlet works:	
109.01	Intake towers.....	1,260.45
109.02	Penstock tunnels.....	1,750.26
109.04	Diversion tunnel No. 3, plugs.....	87,237.57
109.05	Diversion tunnel No. 4, plug.....	122,902.37
109.12	Shafts and galleries.....	7,621.99
	Subtotal.....	220,772.64
110.01	Permanent cableway.....	142.93
111.01	Preparation of aggregate.....	16,271.58
	Total flood control, storage, and irrigation capital.....	16,859,518.21
	III. OVERHEAD AND UNDISTRIBUTED CAPITAL	
301.01	Examination and surveys.....	365,734.88
302	Engineering during construction:	
302.01	Engineering and inspection.....	449,130.38
302.02	Consulting services—general.....	23,118.03
302.03	Consulting services—Boulder City.....	11,031.26
302.04	Colorado River Dam Board.....	10,973.03
302.05	Concrete research.....	170,553.44
302.06	Other research.....	87,018.28
	Subtotal.....	751,854.42
303.01	Law expenditures.....	17,570.18
304.01	General officers and clerks.....	122,769.55
304.02	Photographing, lithographing, printing, and binding.....	13,014.36
304.03	Other miscellaneous expenditures.....	5,710.89
	Total overhead and undistributed capital.....	1,276,654.28
	IV. GENERAL CAPITAL	
401.01	Railroad—Boulder City to Hoover Dam.....	651,546.66
402.01	Construction plant and equipment.....	125,433.97
402.02	General office equipment.....	5,041.49
403.01	Stores department, structures.....	23,096.43
403.02	Machine shop, Denver.....	4,365.71
404.01	Materials and supplies.....	29,339.67
405.01	Concrete testing laboratory.....	65,247.03
406.01	Highway—Boulder City to Hoover Dam—Specification 517.....	367,526.87
407.01	Highway—Specification 519.....	318,296.69
408.01	Telephone system.....	11,237.48
409.01	Garage and fire station.....	16,103.31
410.01	Community garages.....	7,355.34
411.01	Administration building.....	64,167.58
412.01	Dormitory No. 1.....	37,510.00
412.02	Dormitory No. 2.....	1,274.15
413	Government residences:	
413.01	Twelve 3-room brick residences.....	47,985.91
413.02	Twelve 4-room brick residences.....	56,567.07
413.03	Nine 5-room brick residences.....	50,584.62
413.04	Three 6-room brick residences.....	23,565.69
413.05	One 7-room brick residences.....	8,083.65
413.06	Seventeen 3-room frame residences.....	27,044.99
413.07	Thirty 3-room frame residences.....	30,864.76
413.08	Twelve 4-room frame residences.....	21,532.55
413.09	Four 5-room frame residences.....	10,083.59
	Subtotal.....	276,312.83
	Total general capital.....	2,003,855.21
	Total 102 fixed capital under construction.....	20,140,027.70

RECLAMATION TABLE 13.—*Capital investment, Boulder Canyon project, June 30, 1932—Continued*

Physical feature No.	Features	Total
103. OTHER PHYSICAL PROPERTY—BOULDER CITY		
501.01	Municipal building.....	\$47,773.36
502.01	School building No. 1.....	14,123.25
503	Preliminary surveys, Boulder City.....	24,517.84
504	Grounds and landscape.....	54,358.07
505	Sidewalks—gravel, concrete, and parking areas.....	56,596.33
506	Curbs and gutters.....	69,235.08
507	Street paving.....	223,650.82
508	Sewer system, service lines, and disposal plant.....	88,255.93
509	Electric light and power:	
509.01	Dam substation.....	18,006.88
509.02	Transmission lines.....	12,032.70
509.03	Substation pump plant No. 1.....	1,960.49
509.04	Substation pump plant No. 2.....	5,445.80
509.05	Substation, Boulder City.....	7,832.20
509.06	Distribution system, Boulder City.....	53,649.67
	Subtotal.....	98,927.74
510	Water system:	
510.01	Presedimentation basin and pumping plant No. 1.....	63,908.80
510.02	Pumping plant No. 2.....	18,841.71
510.03	Main pipe line.....	137,663.39
510.04	Sump and surge tanks, aerators.....	4,741.91
510.05	Storage and regulator tanks.....	31,286.63
510.06	Treating and filtration plant.....	94,712.91
510.07	Distribution system.....	116,730.27
	Subtotal.....	467,885.62
	Total 103 other physical property.....	1,145,444.04
104. INVESTIGATIONS—COLORADO RIVER BASIN		
101	Flaming Gorge Reservoir.....	333.16
102	Colorado River planning—general.....	2,969.69
103	Dewey Reservoir power.....	12.67
104	Green River, Wyo.....	30,000.38
105	Colorado River Basin, Ariz.....	42,836.48
106	Southern Nevada.....	922.37
107	Southern Utah.....	1,795.81
	Total 104 investigations—Colorado River Basin.....	78,870.56
105. OTHER CAPITAL EXPENDITURES		
105.01	Interest during construction.....	380,661.50
	Grand total capital investment.....	21,745,003.80

RECLAMATION TABLES 14-17.—*Engineering data for projects on completion*

[The following tables of data for projects on completion, covering reservoirs, storage dams, diversion dams, and irrigable areas, are necessarily subject to some revision as the projects develop and more detailed plans are prepared. In so far as they refer to works yet to be built or areas not yet covered by canals they are not to be taken as guaranteeing that such work will ever be done. All future work depends on appropriations therefor by Congress]

No. 14. RESERVOIRS

Project	Name	Area	Capacity	Spillway			
				Length	Elevation above stream bed	Capacity	
						Normal	Maximum
Arizona:		<i>Acres</i>	<i>Acre-feet</i>	<i>Feet</i>	<i>Feet</i>	<i>Sec.-ft.</i>	<i>Sec.-ft.</i>
Salt River.....	Roosevelt.....	18,300	1,637,300	378	224	113,000	150,000
Do.....	Mormon Flat.....	1,000	63,200	243	131	-----	150,000
Do.....	Horse Mesa.....	2,600	245,000	243	243	-----	150,000
Do.....	Stewart Mountain.....	1,300	70,000	243	96	-----	150,000
Do.....	Cave Creek.....	760	14,000	600	53	20,000	60,000
Arizona-California-Nevada:							
Boulder Canyon.....	Boulder Canyon.....	145,000	30,500,000	800	580	-----	400,000
California:							
Orland.....	East Park.....	1,850	51,000	415	88	8,000	12,000
Do.....	Stony Gorge.....	1,280	50,200	90	96	30,000	50,000
Idaho:							
Boise.....	Deer Flat.....	9,835	177,000	None.	-----	-----	-----
Do.....	Arrowrock.....	2,860	280,000	402	247	15,000	40,000
Do.....	Deadwood.....	3,000	160,000	100	142	5,000	11,500
Minidoka.....	Lake Wolcott.....	11,850	150,000	2,385	42	40,000	60,000
Do.....	Jackson Lake.....	25,540	847,000	160	41	7,500	13,000
Do.....	American Falls.....	56,055	1,700,000	540	60	60,000	115,000
Montana:							
Milk River.....	Sherburne Lakes.....	1,730	66,100	160	68	200	8,000
Do.....	Nelson.....	4,560	66,800	(³)	23	-----	-----
Do.....	Point of Rocks.....	180	830	740	8	40	700
Sun River.....	Willow Creek.....	1,050	16,700	50	62.5	-----	2,000
Do.....	Gibson.....	1,360	105,000	314	170	-----	50,000
Do.....	Pishkun.....	1,340	22,000	Under control.	-----	-----	-----
Nebraska-Wyoming:							
North Platte.....	Pathfinder.....	22,700	1,070,000	605	184	40,000	-----
Do.....	Lake Alice.....	900	11,400	100	18	2,500	-----
Do.....	Lake Minatare.....	2,240	60,760	100	55	2,400	-----
Do.....	Winters Creek Lake.....	360	3,000	None.	-----	-----	-----
Do.....	Guernsey.....	2,340	72,700	⁵ 50	45	-----	50,000
				⁶ 128	95	-----	30,000
Nevada:							
Newlands.....	Lake Tahoe.....	124,000	120,000	85	6	2,500	-----
Do.....	Lahontan.....	10,000	273,600	500	112	18,800	30,000
New Mexico:							
Carlsbad.....	Avalon.....	970	7,000	1,026	21	86,000	120,000
Do.....	McMillan.....	6,600	45,000	1,750	26.1-24.9	34,500	60,000
New Mexico-Texas:							
Rio Grande.....	Elephant Butte.....	40,080	2,638,000	275	193	8,000	33,000
Oregon:							
Baker.....	Thief Valley.....	750	17,400	268	43	34,400	-----
Umatilla.....	Cold Springs.....	1,500	50,000	330	90	6,000	6,000
Do.....	McKay.....	1,600	75,000	120	140	10,000	10,000
Vale.....	Warm Springs.....	4,400	190,000	324	91	-----	26,000
Do.....	Agency Valley ⁸	1,950	60,000	300	78	10,000	10,000
Oregon-California:							
Klamath.....	Upper Klamath Lake.....	60,000	400,000	None.	-----	-----	-----
Do.....	Clear Lake.....	25,000	462,000	357	24	10,000	30,000
Do.....	Gerber.....	3,800	94,000	150	63	-----	10,000
Oregon-Idaho: Owyhee.....	Owyhee.....	13,000	715,000	188.5	312	30,000	40,000
South Dakota: Belle Fourche.....	Belle Fourche.....	8,010	203,000	314	100	2,000	2,000
Utah:							
Salt Lake Basin.....	Echo.....	1,470	74,000	72	98	-----	15,000
Do.....	Hyrum.....	(¹⁰)	(¹⁰)	(¹⁰)	(¹⁰)	(¹⁰)	(¹⁰)
Strawberry Valley.....	Strawberry.....	8,370	255,000	58	61	500	2,000

¹ 95,130 acre-feet only, available; above fixed crest of spillway.

² Average flow of stream on which reservoir is located.

³ No spillway; drainage limited; elevation is that of water surface.

⁴ Consists of 8 siphons each 5 feet high and 10 feet wide at throat.

⁵ One 50 by 50 Stoney gate; gate sill 45 feet above river bed.

⁶ Two 64 by 14½ foot drum gates; top elevation 95 feet above river bed.

⁷ At spillway level; proposed to increase to 290,000 by adding 2 feet by movable crest.

⁸ Construction not yet undertaken.

⁹ 715,000 above elevation 2,590. 740,000 above elevation 2,585.6.

¹⁰ Undetermined.

RECLAMATION TABLES 14-17.—*Engineering data for projects on completion—*
Continued

No. 14. RESERVOIRS—Continued

Project	Name	Area	Capacity	Spillway			
				Length	Elevation above stream bed	Capacity	
		Acres	Acre-feet	Feet	Feet	Sec.-ft.	Sec.-ft.
Washington:							
Okanogan	Salmon Lake	240	10,500	Siphon	48		400
Do.	Conconully	460	14,400	180	58	4,500	16,000
Yakima	Bumping Lake	1,300	34,000	235	36		6,000
Do.	Lake Cle Elum	4,890	435,000	185	108		40,000
Do.	Lake Kachess	4,540	210,000	250	53		7,200
Do.	Tieton	2,500	202,500	390	206		50,000
Do.	Lake Keechelus	2,550	152,000	300	60		10,000
Do.	Clear Lake	270	5,830	491	58		6,500
Wyoming:							
Riverton	Pilot Butte	880	30,000	100			500
Do.	Bull Lake ^s	3,100	145,000	170	67	4,000	8,000
Shoshone	Shoshone	6,600	456,600	300	233	11,000	30,000
Do.	Ralston	200	2,100				
Do.	Deaver	80	680	None.			
Total		657,750	44,858,800				

NO. 15. STORAGE DAMS (COMPLETED UNLESS OTHERWISE NOTED)

Project	Name	Type	Maximum height	Crest length	Volume
			Feet	Feet	Cu. yds.
Arizona:					
Salt River	Roosevelt	Rubble masonry arch, gravity.	284	1,125	342,970
Do.	Mormon Flat	Concrete, variable radius arch.	229	623	42,980
Do.	Horse Mesa	do.	305	784	147,360
Do.	Stewart Mountain	Variable radius arch	212	1,260	122,000
Do.	Cave Creek	Reinforced-concrete multiple arch.	109	1,648	18,770
Arizona-California-Nevada: Boulder Canyon.	Hoover ¹¹	Concrete arch, gravity	727	1,180	3,400,000
California:					
Orland	East Park	do.	139	250	12,200
Do.	Stony Gorge	Ambursen, reinforced concrete.	142.5	868	43,140
Idaho:					
Boise	Upper Deer Flat	Earth fill.	70	4,000	¹² 1,190,280
Do.	Lower Deer Flat	do.	40	7,200	¹³ 1,207,610
Do.	Deer Flat Forest	do.	16	950	22,560
Do.	Arrowrock	Rubble concrete arch, gravity	349	1,100	585,130
Do.	Deadwood	Concrete arch	160	700	56,360
Minidoka	Minidoka	Rock fill, concrete core	86	937	242,550
Do.	Jackson Lake	Massive concrete gate section and earth fill.	67	4,450	345,400
Do.	American Falls	Concrete gravity and earth embankment.	87	3,096	177,750
				2,162	171,190
Montana:					
Milk River	Sherburne Lake ¹⁴	Earth fill.	98	1,133	211,460
Do.	Nelson Dikes (5)	do.	28	9,900	¹⁵ 176,600
Do.	Point of Rocks	do.	14	2,680	31,000
Sun River	Willow Creek	do.	71	525	¹⁶ 207,510
Do.	Gibson	Concrete arch	195	960	160,710
Do.	Pishkun Dikes (4)	Earth fill.	42	6,435	327,290

⁸ Construction not yet undertaken.¹¹ Under construction.¹² Also 1,930 cubic yards of concrete.¹³ Also 1,020 cubic yards of concrete.¹⁴ Completed except permanent spillway.¹⁵ Estimated material in enlargement. Actual embankment in 5 dikes 172,334 cubic yards, exclusive of 38,940 cubic yards gravel facing.¹⁶ Earth, 191,760; rock, 15,570; concrete, 180.

RECLAMATION TABLES 14-17.—*Engineering data for projects on completion—*
Continued

NO. 15. STORAGE DAMS (COMPLETED UNLESS OTHERWISE NOTED)—Continued

Project	Name	Type	Maximum height	Crest length	Volume
Nebraska-Wyoming:			<i>Feet</i>	<i>Feet</i>	<i>Cu. yds.</i>
North Platte	Pathfinder	Broken range masonry arch	218	432	60,210
Do	Pathfinder Dike	Earth fill	38	1,650	152,200
Do	Upper Lake Alice	do	30	3,100	240,560
Do	Lower Lake Alice	do	23	2,550	119,000
Do	Minatare	do	65	3,700	570,000
Do	Guernsey	Sand, gravel, and rock fill	105	560	561,260
Nevada:					
Newlands	Lake Tahoe	Concrete sluiceway regulator	14	109	430
Do	Lahontan	Earth and gravel fill with concrete spillways	124	1,400	764,800
New Mexico:					
Carlsbad	Avalon	Earth and rock fill, concrete core	65	1,380	168,770
Do	McMillan	Earth and rock fill	57	2,070	150,740
New Mexico-Texas:					
Rio Grande	Elephant Butte	Rubble concrete, gravity	306	1,162	18 605,200
Do	Elephant Butte Dike	Earth and rock fill	50	2,000	19 178,890
Oregon:					
Baker	Thief Valley	Ambursen, reinforced concrete	66	380	6,290
Umatilla	Cold Springs	Earth and rock fill	98	3,800	789,500
Do	McKay	Gravel fill with concrete paving	165	2,600	2,313,000
Vale	Warm Springs	Concrete arch	109	324	19,460
Do	Agency Valley ⁸	Earth fill	93	1,550	539,000
Oregon-California:					
Klamath	Clear Lake	Rock fill	33	29 790	56,600
Do	Link River	Reinforced concrete	22	435	2,200
Do	Gerber	Concrete arch	85	478	11,900
Oregon-Idaho: Owyhee	Owyhee	Concrete arch, gravity	21 405	810	525,000
South Dakota: Belle Fourche	Belle Fourche	Earth fill	122	6,200	1,600,000
Utah:					
Salt Lake Basin	Echo	Earth and rock fill	155	1,890	1,587,840
Do	Hyrum ²²				
Strawberry Valley	Indian Creek Dike	Earth fill, reinforced concrete core wall	38	1,311	113,660
Do	Strawberry	do	72	488	117,190
Washington:					
Okanogan	Salmon Lake	Earth embankment	40	1,260	194,290
Do	Conconully	Hydraulic earth fill	67	1,000	352,240
Yakima	Bumping Lake	Earth fill	45	3,425	247,700
Do	Cle Elum ¹¹	Rolled earth and gravel fill	135	770	1,259,260
Do	Kachess	do	63	1,400	202,040
Do	Tieton	Earth and rock fill, concrete core wall	222	905	1,995,000
Do	Keechelus	Rolled earth and gravel fill	70	6,500	651,760
Do	Clear Creek	Single concrete arch, gravity abutments	84	404	5,230
Wyoming:					
Riverton	Pilot Butte No. 1	Earth embankment	40	1,350	133,900
Do	Pilot Butte No. 2	do	24	1,150	50,500
Do	Pilot Butte No. 3	do	12	3,400	19,200
Do	Bull Lake ⁸	do	75	3,300	600,000
Shoshone	Shoshone	Rubble-concrete arch	328	200	78,580
Do	Ralston	Earth fill	50	2,200	24,740
Do	Deaver	do	16	1,950	30,300
Total					25,892,200

⁸ Construction not yet under construction.¹¹ Under construction.¹⁷ Including spillway and approaches, 1,674 feet.¹⁸ Including spillway 618,800 cubic yards.¹⁹ Includes concrete pavement, 5,934 cubic yards.²⁰ Not including 357-foot spillway.²¹ 520 feet from lowest concrete in foundation cut-off.²² Not designed.

RECLAMATION TABLES 14-17.—*Engineering data for projects on completion—*
Continued

No. 16. DIVERSION DAMS (COMPLETED UNLESS OTHERWISE NOTED)

Project	Name	Type	Maximum height	Crest length	Volume
			<i>Feet</i>	<i>Feet</i>	<i>Cu. yds.</i>
Arizona:					
Salt River-----	Granite Reef-----	Rubble-concrete weir-----	38	1,000	40,000
Do-----	Power Canal-----	do-----	12.75	400	8,000
Do-----	Joint Head-----	Concrete weir-----	17.5	600	²³ 1,740
Arizona-California:					
Yuma-----	Laguna-----	Indian weir, concrete and rock fill.	²⁴ 19	4,780	²⁵ 451,080
Arizona-California-Nevada: Boulder Canyon.	Imperial ²² -----	do-----	25	1,770	-----
California:					
Orland-----	South Canal-----	Concrete on piling, with rock fill.	20	900	2,890
Do-----	North Side-----	Concrete weir, with removable crest.	8	360	270
Do-----	East Park Feed Canal.	Concrete arch-----	44	154	1,780
Colorado:					
Grand Valley-----	Colorado River-----	Concrete weir with steel rolling crest.	24	542.5	25,860
Uncompahgre-----	Gunnison-----	Crib with rock fill and movable flashboards.	15.75	237	3,200
Do-----	Montrose and Delta.	Timber weir with concrete apron sluiceway and cut off wall.	6.8	68.5	170
Do-----	Loutsenhizer-----	Pile and timber weir-----	8	100	200
Do-----	Selig-----	Pile and timber weir with concrete sump.	6	95.5	200
Do-----	Ironstone-----	Pile foundation with timber deck and needle flashboards.	8.5	58.5	50
Do-----	East Canal-----	Pile and timber weirs, movable flashboards.	(²⁶)	144	70
Do-----	Garnet-----	Rock baskets, faced and surfaced with concrete.	6.5	75	500
Idaho:					
Boise-----	Boise River-----	Rubble-concrete weir-----	²⁸	246	21,750
Do-----	Black Canyon-----	Concrete, gravity-----	183	1,040	79,840
Minidoka-----	Minidoka-----	Combined diversion and storage dam (see Storage).			
Do-----	Milner ²⁷ (3 dams)----	Rock fill and hydraulic earth fill, wooden core-wall.	80	⁴¹ 1,200	⁴² 286,000
Montana:					
Milk River-----	Swift Current-----	Earth and rock-fill timber crib.	18	²⁸ 4,800	84,180
Do-----	St. Mary-----	Concrete-----	11.5	195	1,230
Do-----	Chinook ²⁹ -----				
Do-----	Dodson-----	Timber crib, rock filled, concrete abutment, movable crest.	28	319	12,000
Do-----	Vandalia-----	Hollow reinforced concrete, automatic movable crest, earth embankments.	35	³⁰ 2,100	³¹ 165,800
Sun River-----	Sun River-----	Concrete arch-----	135	212	6,200
Montana-North Dakota: Lower Yellowstone.	Lower Yellowstone----	Rock-filled timber weir----	12	700	14,500
Nebraska-Wyoming: North Platte-----	Whalen-----	Concrete weir, with earth embankments.	35	300	³² 144,860
Do-----	Horse Creek-----	do-----	6	118	4,960
Nevada:					
Newlands-----	Truckee River (Derby).-----	16 concrete sluiceways-----	22	171	3,320
Do-----	Carson River-----	23 concrete sluiceways-----	20	240	2,710
New Mexico: Carlsbad.	Avalon-----	Combined storage and diversion (see Storage).			

²² Not designed.²³ Also 3,770 cubic yards of earth.²⁴ + Maximum height: 40 feet from bottom of sheet piling to top of dam; water raised 10 feet.²⁵ 76,060 concrete, 375,020 rock.²⁶ 2 weirs, one 6 by 72 feet, the other 6 feet 10 inches by 72 feet.²⁷ Constructed by Twin Falls Land & Water Co., and used jointly.²⁸ Crib 2,700 feet, earth fill 2,100 feet.²⁹ Constructed by irrigation districts. No data available as to type and dimensions.³⁰ Dam proper 300 feet, auxiliary spillway 1,200 feet, earth embankment 600 feet.³¹ Concrete 10,660, earth 155,140.³² Concrete 4,970, earth 139,890.

RECLAMATION TABLES 1417.—*Engineering data for projects on completion—*
Continued

No. 16. DIVERSION DAMS (COMPLETED UNLESS OTHERWISE NOTED)—Continued

Project	Name	Type	Maximum height	Crest length	Volume
New Mexico:			<i>Feet</i>	<i>Feet</i>	<i>Cu. yds.</i>
Rio Grande:	Percha.....	Rubble-concrete weir.....	17	³³ 350	³⁴ 4,350
Do.....	Leasburg.....	Rubble-concrete weir on piling.	10.2	³⁵ 600	³⁶ 2,640
Do.....	Mesilla.....	Reinforced concrete piers and bridge over submerged weir.	16.3	³⁷ 303	³⁸ 2,880
Do.....	Mexican ³⁹	Rubble masonry.....	4.7	320	3,710
Do.....	Riverside.....	6 radial gates, concrete piers.	10	106	2,110
Oregon:					
Umatilla.....	Feed Canal (Echo)....	Concrete weir on timber crib.	2.5	400	300
Do.....	Maxwell Canal.....	do.....	2.3	175	40
Do.....	Three-Mile Falls.....	Concrete multiple arch.	24	800	4,160
Vale.....	Harper.....	{ Concrete gravity with earth and rock-filled embankment.	30	700	{ ⁴¹ 690 ⁴² 7,570
Oregon-California:					
Klamath.....	Lost River.....	Ho low reinforced concrete, with earth embankments.	40	290	⁴³ 19,920
Do.....	Lower Lost River.....	Reinforced concrete.....	15	204	630
Do.....	Malone.....	Earth with concrete spillway.	32	515	19,450
Do.....	Miller.....	do.....	12	290	1,600
South Dakota: Belle Fourche.	Diversion.....	Concrete weir.....	23	⁴⁵ 400	⁴⁶ 12,150
Utah:					
Salt Lake Basin.....	Weber-Provo.....	Concrete weir and dike.....	30	1,790	15,380
Strawberry Valley.....	Spanish Fork.....	Reinforced concrete, ogee gravity section.	17	70	1,260
Do.....	Indian Creek Crossing.	Earth fill with clay-filled cut-off trench.	17	1,300	15,180
Washington:					
Okanogan.....	Salmon Creek.....	Concrete weir.....	4	50	130
Yakima.....	Sunnyside.....	Concrete ogee weir, earth dike.	8.5	500	4,450
Do.....	Tieton diversion.....	Concrete weir and rock-filled crib.	4	110	1,370
Do.....	Easton.....	Concrete gravity, with ogee river section.	66	248	6,190
Do.....	Prosser.....	Concrete weir.....	8	768	1,030
Wyoming:					
Riverton.....	Wind River.....	Concrete weir with earth embankment.	37	2,285	⁴⁷ 123,850
Shoshone.....	Corbett.....	Reinforced-concrete weir....	18.5	400	⁴⁸ 4,950
Do.....	Willwood.....	Concrete gravity, with ogee weir section.	69.5	320	22,120
Total.....					1,355,440

³³ 394 feet including sluice gates. Three earth embankments, total length 2,370 feet.³⁴ Also 5,390 riprap, and 33,500 earth.³⁵ Weir section 600 feet, earth embankments 1,665 feet.³⁶ Also 3,850 rock, and 16,720 earth.³⁷ Also earth embankments 2,822 feet and 320 feet.³⁸ Also 1,080 rock and 4,550 earth.³⁹ Constructed by Mexican authorities and used jointly.⁴⁰ Concrete 5,540, rock 1,240, earth 13,140.⁴¹ North dam 300 feet, middle dam 350 feet, south dam 550 feet, north spillway is 570 feet, and main spillway 550 feet.⁴² Rock 117,150, earth 168,850.⁴³ Earth 106,640, concrete 17,210.⁴⁴ Also, 5,250 cubic yard of earth.⁴⁵ 1,700 feet including earth dike.⁴⁶ Also 4,800 cubic yards of earth.

RECLAMATION TABLES 14-17.—*Engineering data for projects on completion—*
Continued

NO. 17. AREA POSSIBLY SUSCEPTIBLE OF IRRIGATION

State, project, and division	Public land			State land unsold	Indian land	Private land		Total
	Entered	Open	Withdrawn			Railroad unsold	Other	
	<i>Acres</i>	<i>Acres</i>	<i>Acres</i>	<i>Acres</i>	<i>Acres</i>	<i>Acres</i>	<i>Acres</i>	<i>Acres</i>
Arizona: Salt River.....							252,264	252,264
Arizona-California:								
Yuma.....	13,748	4,253	34,542		7,853		50,725	111,121
Arizona—								
Valley.....	6,037		2,307		110		43,889	52,343
Mesa.....	1,826	4,253	32,124				6,797	45,000
California-Reservation.....	5,885		111		7,743		39	13,778
California: Orland—Main.....							²¹ 20,704	²¹ 20,704
Colorado:								
Grand Valley.....	13,509		7,784				27,587	48,880
Garfield gravity.....	11,509		4,284				14,587	30,380
Garfield pumping.....	2,000		3,500				3,000	8,500
Orchard Mesa pumping.....							10,000	10,000
Uncompahgre.....	12,874	1,939					60,841	75,654
Idaho:								
Boise.....	69,468		17,320	6,850			251,800	345,498
Arrowrock (Idaho).....	65,892			60			203,869	269,821
Arrowrock (Oregon).....	1,206						5,637	6,903
Notus.....							6,874	6,874
Hillcrest.....	1,000		2,000	1,000			10,100	14,100
Black Canyon.....	1,370		15,320	5,790			25,320	47,800
King Hill.....				335			16,553	16,888
Minidoka.....	92,955	1,285	146,840	9,492			63,016	313,588
South Side pumping.....	30,258			982			17,680	48,920
North Side gravity.....	62,697	1,285		670			5,336	69,988
North Side pumping.....			106,840	7,840				114,680
Gooding.....			40,000				40,000	80,000
Montana:								
Bitter Root.....				75			30,000	30,075
Huntley.....	26,213		2,553		244		3,497	32,507
Gravity.....	21,272		2,007		244		3,497	27,020
Pumping.....	4,941		546					5,480
Divisions—								
Pryor.....	23,549		1,889		66		2,912	28,416
Eastern.....	925		42		178		585	1,730
Fly Creek.....	1,739		622					2,361
Milk River.....	28,940		15,084	5,358			94,179	143,551
Chinook.....	1,941		2,267	1,015			50,550	55,773
Malta.....	21,273		12,365	3,280			28,737	65,655
Glasgow.....	5,726		452	1,063			14,892	22,133
Sun River.....	43,906	475	28,287	4,108			30,066	106,842
Sun River Slope.....	655		13,341	969			3,213	18,178
Big Coulee.....				356			1,934	2,290
Greenfields.....	27,864	475	12,500	2,566			21,258	64,663
Mill Coulee.....	4,197		1,543				2,160	7,900
Fort Shaw.....	11,190		903	217			1,501	13,811
Montana-North Dakota:								
Lower Yellowstone.....	10,648		1,735	611		39	44,339	57,372
Montana.....	5,677		976	471		39	30,479	37,642
North Dakota.....	4,971		759	140			13,860	19,730
Divisions—								
Gravity.....	10,580		1,735	406		39	42,304	55,064
Pumping.....	68			205			2,035	2,308
Nebraska-Wyoming:								
North Platte.....	45,927		2,415	3,508			183,799	235,649
Interstate division.....	9,793		1,257	723			101,134	112,907
Nebraska.....	9,050		1,128	723			99,200	110,101
Wyoming.....	743		129				1,934	2,806
Fort Laramie division.....	29,181		1,152	2,746			73,493	106,572
Nebraska.....	11,070			246			43,715	55,031
Wyoming.....	18,111		1,152	2,500			29,778	51,541
Northport division—								
Nebraska.....	6,953		6	39			9,172	16,170
Nevada:								
Newlands.....	29,308	554	17,512		4,877	7,500	30,249	90,000
Carson.....	25,827	433	12,114		4,877	2,500	27,249	73,000
Truckee.....	3,481	121	5,398				3,000	17,000
New Mexico: Carlsbad.....	45						25,010	25,055

²¹ Includes 416 acres of vested rights and 165 acres of school and town sites.²² Includes some public land, but distribution not known.

RECLAMATION TABLES 14-17.—*Engineering data for projects on completion—*
Continued

NO. 17. AREA POSSIBLY SUSCEPTIBLE OF IRRIGATION—Continued

State, project, and division	Public land			State land unsold	Indian land	Private land		Total
	Entered	Open	Withdrawn			Rail-road unsold	Other	
New Mexico-Texas:	<i>Acres</i>	<i>Acres</i>	<i>Acres</i>	<i>Acres</i>	<i>Acres</i>	<i>Acres</i>	<i>Acres</i>	<i>Acres</i>
Rio Grande.....	550	-----	-----	200	-----	-----	154,250	155,000
New Mexico.....	550	-----	-----	200	-----	-----	87,250	88,000
Texas.....	-----	-----	-----	-----	-----	-----	67,000	67,000
Divisions—	-----	-----	-----	-----	-----	-----	-----	-----
Rincon.....	-----	-----	-----	50	-----	-----	16,950	17,000
Leasburg.....	300	-----	-----	100	-----	-----	30,600	31,000
Mesilla.....	250	-----	-----	50	-----	-----	49,700	50,000
El Paso.....	-----	-----	-----	-----	-----	-----	57,000	57,000
Oregon:	-----	-----	-----	-----	-----	-----	-----	-----
Baker.....	-----	-----	-----	-----	-----	-----	6,000	6,000
Umatilla.....	-----	-----	-----	-----	-----	-----	17,570	17,570
East division.....	-----	-----	-----	-----	-----	-----	10,940	10,940
West division.....	-----	-----	-----	-----	-----	-----	6,630	6,630
Vale.....	2,354	475	1,281	-----	-----	-----	25,890	30,000
Oregon-California:	-----	-----	-----	-----	-----	-----	-----	-----
Klamath.....	22,510	150	12,609	-----	-----	-----	138,534	173,803
Oregon.....	3,945	-----	-----	-----	-----	-----	100,948	104,893
California.....	18,565	150	12,609	-----	-----	-----	37,586	68,910
Divisions—	-----	-----	-----	-----	-----	-----	-----	-----
Main.....	2,505	-----	-----	-----	-----	-----	38,870	41,375
Tule Lake.....	20,005	150	12,609	-----	-----	-----	236	33,000
Pumping.....	-----	-----	-----	-----	-----	-----	20,595	20,595
Langell Valley.....	-----	-----	-----	-----	-----	-----	18,933	18,933
Bonanza Springs.....	-----	-----	-----	-----	-----	-----	5,900	5,900
Lower Klamath Lake.....	-----	-----	-----	-----	-----	-----	22 54,000	54,000
Oregon-Idaho:	-----	-----	-----	-----	-----	-----	-----	-----
Owyhee.....	10,000	-----	19,000	1,000	-----	-----	93,000	123,000
Idaho, complete supply.....	4,000	-----	6,000	-----	-----	-----	28,000	38,000
Oregon—	-----	-----	-----	-----	-----	-----	-----	-----
Complete supply.....	6,000	-----	13,000	1,000	-----	-----	53,000	73,000
Supplemental right.....	-----	-----	-----	-----	-----	-----	12,000	12,000
South Dakota: Belle Fourche.....	33,670	246	4,918	2,575	-----	-----	38,693	80,102
Utah:	-----	-----	-----	-----	-----	-----	-----	-----
Strawberry Valley.....	2,003	-----	-----	-----	-----	-----	51,886	53,889
High Line.....	2,003	-----	-----	-----	-----	-----	19,853	21,856
Spanish Fork.....	-----	-----	-----	-----	-----	-----	22,033	22,033
Springville-Mapleton.....	-----	-----	-----	-----	-----	-----	10,000	10,000
Salt Lake Basin.....	-----	-----	-----	-----	-----	-----	77,000	77,000
Washington:	-----	-----	-----	-----	-----	-----	-----	-----
Okanogan.....	116	-----	-----	-----	-----	-----	7,184	7,300
Gravity.....	116	-----	-----	-----	-----	-----	6,009	6,125
Pumping.....	-----	-----	-----	-----	-----	-----	1,175	1,175
Yakima.....	6,974	-----	13,380	5,605	241	18,169	295,371	339,740
Sunnyside.....	2,627	-----	-----	30	241	-----	104,702	107,600
Tieton.....	1,664	-----	-----	-----	-----	-----	28,376	30,040
Kittitas.....	-----	-----	4,682	1,076	-----	376	65,806	72,000
Roza.....	120	-----	1,523	2,067	-----	11,310	43,330	58,350
Moxee.....	1,663	-----	775	1,332	-----	2,783	30,197	36,750
Kennewick.....	900	-----	6,400	1,100	-----	3,700	22,900	35,000
Wyoming:	-----	-----	-----	-----	-----	-----	-----	-----
Riverton.....	2,746	7,876	58,378	-----	1,000	-----	30,000	100,000
Shoshone.....	56,254	5,668	89,316	4,799	-----	409	52,440	208,886
Montana, Frannie division.....	-----	-----	86	4	-----	-----	-----	90
Wyoming—	-----	-----	-----	-----	-----	-----	-----	-----
Garland division.....	37,111	190	2,071	252	-----	-----	2,362	41,986
Frannie division.....	14,190	395	3,226	331	-----	235	1,564	19,941
Willwood division.....	4,793	5,083	1,369	305	-----	-----	319	11,869
Heart Mountain division.....	160	-----	37,564	1,907	-----	174	1,195	41,000
Oregon Basin division.....	-----	-----	45,000	2,000	-----	-----	1,000	48,000
Greybull Valley division.....	-----	-----	-----	-----	-----	-----	46,000	46,000
Total.....	524,718	22,921	472,954	44,516	14,215	26,117	2,172,507	3,277,948

RECLAMATION TABLE 18.—*Summary of construction results to June 30, 1932*

Items	To June 30, 1932		To June 30, 1931		Increase	
Reservoir capacity available (original) -----	Acre-feet 13, 687, 140		Acre-feet 13, 204, 528		Acre-feet 482, 612	
CANALS, DITCHES, AND DRAINS						
Canals over 800 second-feet capacity -----	Miles 683. 2		Miles 680. 9		Miles 2. 3	
Canals 301 to 800 second-feet capacity -----	766. 1		753. 7		12. 4	
Canals 50 to 300 second-feet capacity -----	2, 375. 9		2, 356. 5		19. 4	
Canals less than 50 second-feet capacity -----	9, 856. 6		9, 802. 5		54. 1	
Total canals -----	13, 681. 8		13, 593. 6		88. 2	
Waste-water ditches -----	1, 103. 6		1, 099. 7		3. 9	
Drains, open -----	2, 596. 1		2, 533. 0		63. 1	
Drains, closed -----	241. 1		240. 3		. 8	
Total -----	3, 940. 8		3, 873. 0		67. 8	
Grand total -----	17, 622. 6		17, 466. 6		156. 0	
TUNNELS						
Number -----	142		132		10	
Length (feet) -----	243, 050		210, 417		32, 633	
STORAGE AND DIVERSION DAMS						
Masonry -----	Cubic yards 3, 665, 526		Cubic yards 3, 347, 863		Cubic yards 317, 663	
Earth -----	17, 233, 785		17, 041, 342		192, 443	
Rockfill and crib -----	2, 302, 680		2, 299, 091		3, 589	
Total -----	23, 201, 991		22, 688, 296		513, 695	
DIKES AND LEVEES						
Length and volume -----	Feet 1, 365, 606	Cu. yds. 7, 821, 041	Feet 1, 348, 093	Cu. yds. 7, 506, 191	Feet 17, 513	Cu. yds. 314, 850
CANAL STRUCTURES						
	Concrete	Wood	Concrete	Wood	Concrete	Wood
	Number	Number	Number	Number	Number	Number
Costing over \$2,000 -----	1, 733	270	1, 698	270	35	0
Costing \$500 to \$2,000 -----	3, 966	1, 230	3, 916	1, 198	50	32
Costing \$100 to \$500 -----	22, 033	12, 066	21, 319	12, 000	714	66
Costing less than \$100 -----	36, 943	89, 744	35, 862	89, 164	1, 081	580
Total -----	64, 675	103, 310	62, 795	102, 632	1, 880	678
Grand total -----	167, 985		165, 427		2, 558	
BRIDGES						
	Number	Length	Number	Length	Number	Length
Steel -----	113	9, 175	113	9, 175	0	0
Combination -----	486	15, 211	485	15, 172	1	39
Wood -----	11, 344	270, 083	11, 164	265, 824	180	4, 259
Concrete -----	434	5, 867	432	5, 842	2	25
Total -----	12, 377	300, 336	12, 194	296, 013	183	4, 323
CULVERTS						
	Number	Length	Number	Length	Number	Length
Concrete -----	4, 677	256, 739	4, 552	249, 950	125	6, 789
Metal -----	4, 732	185, 544	4, 534	176, 965	198	8, 579
Terra cotta -----	2, 158	86, 420	2, 158	86, 420	0	0
Wood -----	4, 552	127, 880	4, 543	127, 736	9	144
Total -----	16, 119	656, 583	15, 787	641, 071	332	15, 512
PIPE						
	Linear feet		Linear feet		Linear feet	
Concrete -----	1, 269, 588		1, 230, 993		38, 595	
Metal -----	687, 419		576, 263		111, 156	
Terra cotta (tile) -----	2, 005, 104		1, 919, 854		85, 250	
Wood -----	749, 499		700, 947		48, 552	
Total -----	4, 711, 610		4, 428, 057		283, 553	

RECLAMATION TABLE 18.—*Summary of construction results to June 30, 1932—Con.*

Items	To June 30, 1932		To June 30, 1931		Increase	
FLUMES	Number	Length	Number	Length	Number	Length
Concrete.....	131	90,058	127	78,046	4	12,012
Metal.....	2,356	249,665	2,334	248,595	22	1,070
Wood.....	3,103	553,757	3,079	551,999	24	1,758
Total.....	5,590	893,480	5,540	878,640	50	14,840
CANALS LINED	Concrete	Wood	Concrete	Wood	Concrete	Wood
Length (miles).....	517.9	4.2	495.1	4.2	22.8	0
Total.....	522.1		499.3		22.8	
BUILDINGS	Number		Number		Number	
Offices.....	113		108		5	
Residences.....	832		747		85	
Power plants.....	41		37		4	
Pumping stations.....	309		301		8	
Barns, storehouses, etc.....	603		579		24	
Total.....	1,898		1,772		126	
WELLS	Number	Depth	Number	Depth	Number	Depth
Number and depth (ft.).....	752	85,453	747	85,067	5	386
COMMUNICATIONS	Miles		Miles		Miles	
Roads.....	1,477.0		1,461.4		15.6	
Railroads.....	120.4		117.3		3.1	
Telephone lines.....	4,043.6		4,010.6		33.0	
Transmission lines.....	3,308.4		3,225.7		82.7	
Total.....	8,949.4		8,815.0		134.4	
POWER DEVELOPED						
Water and steam, horsepower.....	195,934		189,934		6,000	
EXCAVATION	Cubic yards		Cubic yards		Cubic yards	
Class 1, earth.....	275,174,562		270,511,459		4,663,103	
Class 2, indurated material.....	18,469,781		18,265,716		204,065	
Class 3, rock.....	17,821,364		15,019,997		2,801,367	
Total.....	311,465,707		303,797,172		7,668,535	
Riprap (cubic yards).....	2,579,851		2,570,254		9,597	
Paving (square yards).....	1,934,769		1,974,756		10,013	
Concrete (cubic yards).....	5,115,964		4,776,359		339,605	
Cement (barrels).....	5,861,995		5,350,393		511,602	
Gunite (square yards).....	912,096		912,096		0	

RECLAMATION TABLE 19.—Power plants operated on Bureau of Reclamation projects during fiscal year 1931-32

Project	Name of plant	Out- going line voltage (kilovolts)	Plant capac- ity (kilo- watts)	Num- ber of units	Head in feet	First cost of plant	Cost of operation and main- tenance	Esti- mated depre- ciation	Cost per kilo- watt- hour exclu- sive of depre- ciation	Distribution of kilowatt-hours generated				Total out- put, kilo- watt-hours	Gross power sales
										Sold to con- sumers	Irrigation and drain- age re- quire- ments	Used for other purposes	Losses		
Boise	Black Canyon	66,000	10,000	2	74-86	\$414,317.21	\$10,350.01	\$15,201.07	\$0.00029	12,388,000	23,247,000	661,000	-----	36,296,500	\$83,138.51
Mindoka	Boise River	22,000	1,875	3	20.4-25.7	167,905.37	3,372.65	5,876.69	.00037	-----	1,097,701	-----	-----	1,097,701	8,533.94
	Mindoka	33,000	10,000	6	46.77	784,778.13	24,764.74	24,396.00	.00043	19,857,077	28,053,710	8,910,874	4,065,366	58,245,000	164,871.51
	American Falls (2 plants) ³	33,000	540	1	44	470,975.00	-----	-----	-----	-----	-----	-----	-----	-----	-----
Newlands ⁴	Lahontan ⁷	66,000	1,875	3	105-110	141,886.01	6,230.50	4,260.00	.00290	1,428,900	98,703	621,637	-----	2,149,240	7,412.14
North Platte	Guernsey	33,000	6,000	2	70-90	454,244.27	13,844.20	8,055.00	.00102	19,934,138	12,920	305,373	2,128,839	13,550,000	244,050.22
	Langley	33,000	1,750	1	106	184,791.74	12,508.75	5,200.00	.0021	None.	None.	90,800	Unknown.	90,800	None.
	Elephant Butte	2,300	1,500	1	18-180	8,440.50	1,970.04	None.	.0021	None.	None.	267,595	189,615	1,462,940	22,623.77
Rio Grande	Pilot Butte	33,000	2,000	2	103	218,962.14	25,406.11	7,800.00	.01737	1,005,730	None.	-----	-----	91,220,000	23,059,000
	Riverton	110,000	33,000	3	265	754,885.13	32,977.07	37,744.25	.00035	-----	-----	-----	-----	22,200,000	31,103,000
	Horse Mesa	110,000	19,250	7	70-240	1,235,894.58	60,091.92	61,794.73	.02021	-----	-----	-----	-----	11,755,600	2,094,616.40
Salt River	Roosevelt	110,000	13,000	1	35-114	326,371.98	12,486.24	16,018.60	.00056	-----	-----	-----	-----	7,497,400	-----
	Stewart Moun- tain	45,000	8,750	1	40-150	482,767.80	12,539.54	24,138.39	.00040	-----	-----	-----	-----	2,487,925	2,953,410
	Mormon Flat	110,000	5,250	6	111	755,147.29	20,075.70	37,757.36	.00171	185,484,347 ⁵	22,372,620	167,437,533	33,200,730	11,755,600	2,094,616.40
South	Crosscut	40,000	2,000	2	34	163,139.60	10,822.63	8,156.98	.00144	-----	-----	-----	-----	2,487,925	2,953,410
	Consoli- dated.	11,000	1,000	2	19	109,500.73	8,075.24	5,475.04	.00325	-----	-----	-----	-----	2,487,925	2,953,410
	Arizona Falls	11,000	600	1	40	91,990.84	4,599.54	4,599.54	.00294	-----	-----	-----	-----	2,487,925	2,953,410
Shoshone	Chandler	33,000	7,000	3	220	746,505.72	13,168.38	26,085.42	.00245	4,529,170	None.	87,889	701,651	5,378,710	69,962.83
	Shoshone	11,000	1,000	2	123.5	60,904.80	20,034.70	3,627.48	.00660	2,833,479	None.	11,334	283,348	3,128,161	38,824.24
	Spanish Fork	11,000	1,000	2	123.5	60,904.80	20,034.70	3,627.48	.00660	-----	-----	-----	-----	3,128,161	38,824.24
Yakima - Sun- nyside, ⁶	Rocky Ford	6,600	187	1	73	23,000.00	2,478.24	1,056.40	.00497	None.	499,000	None.	None.	499,000	None.
	Yakima - Sun- nyside, ⁶	33,000	2,000	2	9.88	317,936.09	12,212.55	13,248.00	.00139	7,275,404	1,023,076	88,783	379,586	18,706,849	68,426.52
	Siphon Drop	33,000	2,000	2	9.88	317,936.09	12,212.55	13,248.00	.00139	-----	-----	-----	-----	18,706,849	68,426.52

¹ 6,600-volt generators; all others 2,300 volts except as noted.² Entire output delivered to Idaho Power Co.³ West Side plant operated only in case of emergency; not operated since 1927.⁴ Estimated.⁵ All 5 power plants feed into the same distribution system.⁶ Includes purchased power.⁷ Operated by Irrigation district or water users' association.⁸ Operated by Sierra Pacific Power Co. under lease assigned by Canyon Power Co.⁹ 11,000-volt generators.

RECLAMATION TABLE 20.—Principal contracts for sale of power in force June 30, 1932

Project	Contractor	Date of contract	Date of expiration	Reserved power (kilowatts)	Gross rate per kilowatt-hour (cents)	Minimum monthly payment	Gross income, fiscal year 1931-32	Remarks
Boise	Gem Irrigation District— Idaho Power Co.	Oct. 18, 1924 Apr. 10, 1930	Oct. 18, 1934 Apr. 15, 1936	1,000	(Rental basis leased for standby service.)			Served through Idaho Power Co. from Black Canyon power plant, covers Boise River power plant.
Minidoka	Optario-Nyssa Irrigation District— City of Burley, Idaho— City of Rupert, Idaho— Paul Electric Co.— Village of Albion, Idaho— Unity Light & Power Co.— Village of Declo— Rural Electric Co.— East End Mutual Electric Co.— Village of Heyburn, Idaho— Village of Minidoka, Idaho— Declo Light & Power Co.— Ferry Light & Power Co.— Amalgamated Sugar Co.— Acequia Mutual Electric Co.— West End Power Co.— Riverside Electric Co.— 40 small contracts— Sierra Pacific Power Co.	Apr. 11, 1931 Jan. 1, 1930 do. Feb. 4, 1924 Jan. 1, 1931 Mar. 1, 1933 Oct. 1, 1930 Apr. 1, 1932 Feb. 1, 1928 Jan. 1, 1930 Feb. 5, 1924 May 1, 1928 Mar. 1, 1934 May 1, 1932 Dec. 1, 1930 Jan. 1, 1931 Feb. 1, 1928 Various. Jan. 29, 1923	Oct. 18, 1934 Apr. 15, 1936 do. Mar. 31, 1934 Jan. 1, 1933 Mar. 1, 1935 Oct. 1, 1933 Apr. 1, 1937 Feb. 1, 1933 Jan. 1, 1933 Jan. 1, 1934 Apr. 1, 1933 May 1, 1934 Mar. 1, 1934 May 1, 1933 Dec. 1, 1935 Jan. 1, 1936 Feb. 1, 1933 Various. Nov. 30, 1934	1,000 1,000 2,100 1,300 150 280 67 41 79 20 80 30 20 15 39 19 15 15 1,500	4-5 4-5 4-5 4-5 4-5 4-5 4-5 4-5 4-5 4-5 4-5 4-5 4-5 4-5 4-5 4-5 4-5 4-5 3-4	\$2,100.00 900.00 416.67 193.68 89.24 59.04 43.85 31.68 60.00 150.00 31.68 24.30 39.70 30.10 24.30 24.30 1,020.79 1,337.80 1,200.00	\$54,772.45 30,019.01 6,531.67 6,271.67 4,023.18 2,980.33 2,126.23 1,710.54 1,752.51 1,848.95 1,578.66 1,450.74 1,485.06 1,134.37 984.05 24.30 1,020.79 1,337.80 7,412.14	Contract assigned by Canyon Power Co. to Sierra Pacific Power Co.
Newlands								
North Platte	Western Public Service Co.— Mountain States Power Co., Casper, Wyo. Town of Wheatland, Wyo. Colorado Fuel & Iron Co.— Town of Torrington, Wyo. City of Gering, Nebr.— City of Mitchell, Nebr.— Village of Morrill, Nebr.— Village of Lyman, Wyo.— Town of Guernsey, Wyo.— Town of Lingle, Wyo.— Mountain States Power Co., Yoder, Wyo.	Oct. 29, 1927 Nov. 13, 1931 May 3, 1928 May 18, 1925 Apr. 3, 1928 Apr. 17, 1928 Apr. 30, 1928 May 1, 1928 Apr. 10, 1928 May 17, 1928 Apr. 30, 1928 July 15, 1929	Oct. 29, 1937 Dec. 31, 1941 June 30, 1938 Jan. 1, 1941 June 30, 1938 do. do. do. do. do. do. do. Dec. 31, 1934	400 1,200 500 1,200 400 250 250 150 250 150 75 25	8-1 8-1 8-1 8-1 8-1 8-1 8-1 8-1 8-1 8-1 8-1 8-1	2,400.00 4,200.00 800.00 1,800.00 800.00 800.00 800.00 300.00 250.00 450.00 175.00 75.00	42,109.11 57,516.48 24,423.28 16,227.77 23,425.78 19,199.20 15,575.08 11,262.71 8,751.80 6,685.55 4,974.62 3,027.28	

Town of Fort Laramie, Wyo.	May 7, 1928	June 30, 1933	25	8-1	50.00	1,559.31
Holly Sugar Corporation, Torrington, Wyo.	Apr. 7, 1932	May 1, 1937	75	2.5-1.5	None.	1,388.50
Western Public Service Co., Huntley, Wyo.	Dec. 1, 1930	Dec. 31, 1935	75	8-1	187.50	3,646.44
2 small contracts.	Various.	Various.	3	8-5	Various.	87.72
Mountain States Power Co.	Mar. 5, 1929	Dec. 31, 1943	300	6-1	1,500.00	20,165.79
do.	July 1, 1930	July 1, 1940	1,000	2.5-5	3,350.00	65,125.40
Farm Light & Power Co.	Aug. 15, 1928	Aug. 15, 1933	3	5-1	14.25	1,001.40
C., B. & Q. R. Co.	June 1, 1923	Jan. 11, 1934	20	6-1	30.00	1,803.14
2 small contracts.	Various.	Various.	145	6-5	Various.	875.93
Town of Spanish Fork, Utah.	May 1, 1928	May 1, 1931	185	6-75	740.00	13,415.79
Town of Payson, Utah.	Feb. 5, 1932	Feb. 4, 1935	125	6-75	500.00	12,438.14
Utah Packing Corporation.	Jan. 1, 1926	Jan. 1, 1933	385 and 20	6-75	577.50-30.00	4,882.26
Town of Springville, Utah.	June 18, 1931	June 17, 1932	-----	2.2-1	None.	4,094.61
Town of Salem, Utah.	Feb. 5, 1932	Feb. 4, 1935	15	6-75	60.00	1,747.47
Several small contracts.	Various.	Various.	-----	Various.	Various.	2,335.97
Southern Sierras Power Co.	July 14, 1926	July 14, 1935	To production limit.	1-75	-----	54,503.47
2 small contracts.	Various.	Various.	4-1	-----	-----	1,284.10
						Do.

² Minimum payment guaranteed on annual basis.

¹ April to September, inclusive.

Each contract less than \$1,000.

Do.
A new contract is being made.

Do.
Do.
Each contract less than \$1,000.

Do.

RECLAMATION TABLE 21.—Pumping plants operated on reclamation projects during fiscal year 1931-32

Project	Name of plant	Type of units	Plant capacity		Num- ber of units	Static lift (feet)	First cost of plant	Cost of operation and main- tenance	Estimated deprecia- tion	Energy used for pumping (kilowatt- hours)	Acre- feet pumped	Cost per acre- foot without depreciation	
			Horse- power	Second- foot								Per acre- foot	Per foot lift
Boise Grand Valley Huntley 1 Klamath	Black Canyon	V. T. D. S.	1,244	300	2	28.5	\$149,901.39	\$1,457.95	\$6,621.96	57,505	57,505	\$0.0009	
	Price-Stub	V. T. D. C.	125	28	1	31.0	46,697.83	488.28	1,000.00	4,722	4,722	.00332	
	Huntley 1	V. T. D. C.	620	60	2	45.0	73,833.32	2,058.02	2,000.00	14,810	14,810	.0031	
	Ballantine Auxiliary	O. E. D. C.	400	45	2	45.0	71,103.56	3,396.51	3,500.00	2,691	2,691	.028	
	Tule Lake No. 1	V. M. D. S.	120	30	2	5.69	43,220.00	879.84	2,200.00	64,460	4,016	.0385	
	Tule Lake No. 2	V. M. D. S.	60	30	1	5.79		492.91		38,980	2,601	.0327	
	Tule Lake No. 3	V. M. D. S.	85	42	2	5.85				195,200	1,181	.0242	
	Tule Lake No. 4	V. M. D. S.	130	60	2	7.23	11,890.00	2,506.75	600.00	349,180	18,249	.0190	
	Tule Lake No. 5 1	V. M. D. S.	180	102	3	3.24	11,038.84	572.68	100.00	56,800	5,798	.0088	
	Dry Lake No. 1	V. T. D. C.	75	19.3	1	51.0	8,861.11	120.00	1,200.00	380,000	3,315	.381	.0075
Lower Yellowstone Minidoka 1	Dry Lake No. 2	V. M. D. S.	100	15.4	1	44.8	3,366.73	1,425.00	400.00	9,656,852	11,049	.475	.00086
	Thomas Point	H. T. D. C.	220	45	2	31.0	49,970.43	294.63	1,000.00	9,273,055	210,650		
	Pumping Plant No. 1	4 V. M. D. C., 1 V. M. D. M.	4,600	897	5	28.22	233,731.09			5,257,200	122,304		
	Pumping Plant No. 2	V. M. D. C.	3,730	780	5	30.31	226,432.40			608,110	19,576		
	Pumping Plant No. 3	V. M. D. C.	1,900	467	3	29.12	103,107.00			175,100	5,597		
	Boersch Lake	V. M. D. C.	200	50	2	20.0	32,947.72			114,792			
	Canal 20 pump	V. M. D. C.	150	25	1	21.25	18,741.61			121,064			
	West End	H. M. D. C.	150	40	2					98,412			
	D-15 pumping station	V. M. D. C.	120	42	3					28,305			
	Sugar factory pump	V. M. D. C.	80	28	2					11,860			
MacRae 6 small pumping stations	D-4 pumping station	Scoop wheel	25	20	1	3.5	3,328.43	29,121.88		17,140			
	D-2 pumping station	H. M. D. C.	15	4	1	14.0	1,696.56						
	1817 pumping station	Scoop wheel	10	11	1	4.8	3,634.71						
	C-2 pumping station	Scoop wheel	10		1	2.5							
	Rupert pumping station	H. M. D. C.	10	4	1	14.0				17,140			
	114 pumping station	H. M. D. C.	7.5	4	1	7.0	2,803.97			9,873			
	1812 pumping station	H. M. D. C.	7.5	2	1	4.0	1,008.76			\$50,320			
	MacRae pumping station	H. M. D. C.	7.5	2	1	4.0	864.77			151,187			
	6 small pumping stations	3 H. M. and 3 V. M. D. C.	70.0		6								
	3 drainage pumping plants	H. M. D. C.	45.0	17	3	13	17,011.91			162,520			

Newlands	Stillwater ⁶	200	45	1	11.11	11,311.50	2,306.08	1,131.15	76,527	2,192	1.05	.0947
	Lahontan Rock Dam ditch ⁷	50	20	1	12.4	2,301.37	969.01	230.14	18,4 ⁸	564	1.72	.138
	Schrimsher drain	10	2	1	10.74	1,248.18	78.45	125.00	1,1 ⁹	15	5.23	.487
	Wiggins drain	7	2	6	30-52	996.31	148.06	100.00	1,80	35	2.50	.705
North Platte ¹	Dutch Flats drainage pumps	70	8	3	30-52	23,393.94	297.00	1,000.00	12,920	119	2.50	.075
Okanogan	Robinson Flat	400	12	2	188	37,077.24	7,455.13			1,955	3.81	.02
	Duck Lake	125	10	2	55-80	10,201.92	2,540.42			1,004	2.530	.038
Rio Grande	Mesa drain	75	45	3	5-8	17,971.38	8,000.52	180.00	235,780	11,120	2.72	.131
Salt River ¹	do	3,885	196	31	97	399,830.90	54,601.75	27,988.79	4,617,615	24,639	2.19	.02258
	Phoenix Division	2,700	132	57	73	386,626.41	61,922.49	27,063.43	4,602,137	27,884	2.22	.03041
	Tempe Division	2,230	230	31	58.0	186,724.58	87,631.63	13,070.72	4,738,951	41,355	1.39	.0240
	Salt River Division	3,220	164	32	57.0	250,060.27	33,329.96	17,504.22	2,590,718	22,546	1.48	.0260
	Chandler Division	1,235	94	11	59	192,379.94	16,019.30	13,406.60	1,298,921	10,864	1.47	.02402
	M. D. S.											
	Highline	950	105	4	50	66,656.83	37,123.91	4,665.98	3,142,080	2,641	1.25	.025
	Laveen	420	40	6	53	43,861.41	11,732.47	3,070.30	796,159	7,685	1.53	.02887
	Joint head booster pump	300	100	2	20	23,000.00	1,950.97	1,610.00	168,116	3,657	.533	.027
	Booster pump 22E-1½S	150	16	1	20	6,245.00	2,414.61	437.15	199,410			
	Tempe pumping plant ⁸	150	6	1	50	8,513.84	427.33	595.97				
	Heard pumping plant	125	5	1	50	10,000.00	23.63	1,000.00				
	Mariopa Garden Farm	75	12	1	52.44	12,444.24	2,981.16	870.10	185,641	2,367	1.26	.02403
	Mesa Cemetery booster pump	50	6	1	8	2,650.00	485.58	185.50	3,277			
	Booster pump 23E-10¾N	15	7.5	1	5	971.57	256.20	68.00	18,035			
	Pump 23E-5N	15	4	1	12	1,533.83	224.01	107.37	7,228			
	15th Avenue booster pump	8	4	1	8	1,000.00	113.33	70.00	4,352			
	Booster pump 09E-5N	7.5	4	1	10	1,586.67		108.97				
	Booster pump 13¾E-12¾N	5	2	1	5	781.01		34.67				
Yakima-Sunny-side ¹	Suipes Mountain	850	22	3	200	78,000.00	1,922.00	1,890.00		6,004	.3?	.0016
	Outlook											
	Grandview	800	49.5	2	110	92,000.00	3,716.14	2,480.00		14,616	.254	.0023
	Prosser	365	36.5	3	35-78	72,500.00	3,037.65	3,120.00	499,000	11,936	.254	.0038
	Spring Creek	190	12	1	105	31,968.00	1,290.62	1,500.00		3,149	.407	.0039
	Hillcrest	160	11.6	1	90	28,056.00	1,337.09	1,500.00		3,561	.375	.0042
	Little Snipes Mountain	35	1.56	1	103	5,800.00	390.00	300.00		184	2.12	.02
		5	.33	1	50	1,065.00	240.00	68.71		135	1.778	.0356

¹ Operated by district or water users' association.

² Placed in operation on May 12, 1932.

³ Incomplete plant under construction.

⁴ Cost of operating all Mindoka project pumps for year ending Oct. 31, 1931.

⁵ Includes energy used by 3 other small pumps.

RECLAMATION TABLE 21.—Pumping plants operated on reclamation projects during fiscal year 1931-32—Continued

Project	Name of plant	Type of units	Plant capacity		Num-ber of units	Static lift (feet)	First cost of plant	Cost of operation and main-tenance	Estimated depreciation	Energy used for pumping (kilowatt-hours)	Acre-foot pumped	Cost per acre-foot without depreciation	
			Horse-power	Second-foot								Per acre-foot	Per foot lift
Yuma	B-Lift	{ 1 V. M. D. C. 2 H. M. D. C.	1,100	105	3	71.69	\$165,204.32	\$8,266.00	5,520.00	\$1,004,500	7,731	\$1.07	\$0.015
	Valley drainage	{ 1 O. E. D. C. 2 H. M. D. C.	800	430	3	13.30	169,270.47	\$ 10,552.00	5,970.00	1,017,000	33,079	.319	.024
	Reservation	{ 1 G. E. G. C. 1 G. E. D. C.	130	56	2	2.81	6,775.00	\$ 2,075.00	338.00	¹⁰ 5,241	2,305	.90	.32
	West Yuma	H. M. D. C.	20	4.6	1	7	1,800.00	\$ 128.00	95.00	6,076	154	.831	.119

⁸ Plant operated from July 1 to 31, 1931.⁷ Plant operated from July 1 to 24, 1931.⁹ Abandoned temporarily.⁹ Amount for June, 1932, estimated.¹⁰ Gallons of fuel.

Type:

V. M. D. M.—Vertical motor-driven Moody spiral pump.

V. M. D. C.—Vertical motor-driven centrifugal pump.

H. M. D. C.—Horizontal motor-driven centrifugal pump.

S. T. D. C.—Steam turbine-driven centrifugal pump.

V. T. D. C.—Vertical hydraulic turbine-driven centrifugal pump.

H. T. D. C.—Horizontal hydraulic turbine-driven centrifugal pump.

O. E. D. C.—Oil engine-driven centrifugal pump.

G. E. D. C.—Gas engine-driven centrifugal pump.

G. E. G. C.—Gas engine gear-driven centrifugal pump.

V. T. D. S.—Vertical hydraulic turbine-driven screw pump.

V. M. D. S.—Vertical motor-driven screw pump.

RECLAMATION TABLE 22.—*Estimate of seepage and summary of drainage work to June 30, 1932*

State and project	Constructed drains ¹		Estimated area damaged by seepage on June 30, 1932	Estimated area protected by constructed drains	Estimated area that will be protected when all drains authorized have been constructed
	Open	Closed			
	Miles	Miles	Acres	Acres	Acres
Arizona: Salt River ^{2 3}	15.85	5.30		60,000	60,000
Arizona-California:					
Yuma Reservation.....	11.70	4.00		8,000	8,000
Yuma Valley.....	46.70		2,000	35,500	50,000
Colorado:					
Grand Valley—					
Project lands.....	63.85	.83	100	7,700	7,700
Grand Valley drainage district.....	38.30	1.00	29,000	10,000	10,000
Teller Institute.....	2.80			300	300
Frey drain.....	1.60			300	300
Orchard Mesa.....	14.38	.24	50	2,200	2,200
Uncompahgre ⁴	5.50	99.50	17,000	10,700	10,700
Idaho:					
Boise—					
Riverside district.....	44.50		500	11,300	11,300
Pioneer district.....	78.50	.40	6,000	24,800	24,800
Nampa and Meridian district.....	45.80		1,400	51,000	51,000
Notus division.....	9.20		50	6,800	6,800
Project lands.....	98.70	.30	800	31,700	31,700
King Hill ²83		180	800	800
Minidoka—					
Gravity division.....	134.80		800	34,750	35,000
Pumping division.....	18.00		200	4,500	4,600
Montana:					
Huntley.....	30.91	52.40	800	23,000	23,560
Milk River—					
Malta division.....	.50	.10	3,000	300	300
Glasgow division.....	1.20	.50	400	200	200
Sun River—					
Fort Shaw division.....			3,997		
Greenfields division.....	27.80		1,200	15,600	20,100
Montana-North Dakota: Lower Yellowstone.....	98.90	1.10	5,000	13,000	13,000
Nebraska-Wyoming:					
North Platte—					
Interstate division.....	45.34	12.42	3,000	10,000	10,000
Interstate division ⁵	57.10				
Fort Laramie division.....	127.50		2,500	25,000	25,000
Fort Laramie division ⁶	67.08				
Northport division.....	8.42		70	2,500	2,500
Nevada:					
Newlands—					
Carson division.....	257.21	3.99	1,034	82,307	82,547
Truckee division.....	20.73		98	6,635	6,635
New Mexico: Carlsbad.....	14.30	3.43	3,000	7,700	7,700
New Mexico-Texas:					
Rio Grande—					
Rincon division.....	40.21		2,000	16,000	17,000
Leasburg division.....	70.80		3,000	30,700	31,000
Mesilla division.....	144.11		7,800	48,700	50,000
El Paso division.....	193.25		6,000	55,500	57,000
Oregon:					
Umatilla ²	14.30	.20	1,200	3,500	3,500
Vale-Warmsprings district.....	56.85			19,790	19,790

¹ Surface drains and waste ditches not included.² Projects being operated by water users or districts who have not furnished data to June 30, 1932. Data shown are from last report.³ Drainage largely by pumps, water recovered being used for irrigation purposes.⁴ Constructed by landowners, water users, or drainage districts.⁵ Outlet channels, of which 29.08 miles were built by the United States partly under cooperative contracts, 21.67 miles by the Farmers irrigation district, 2 miles by the Morrill drainage district, and 4.35 miles by Drainage District No. 1.⁶ Outlet channels, of which 56.68 miles were built by the United States as part of canal wasteway and drainage system and 10.4 miles by the United States under cooperative contract with the Gering irrigation district.⁷ Area benefited.

RECLAMATION TABLE 22.—*Estimate of seepage and summary of drainage work to June 30, 1932—Continued*

State and project	Constructed drains ¹		Estimated area damaged by seepage on June 30, 1932	Estimated area protected by constructed drains	Estimated area that will be protected when all drains authorized have been constructed
	Open	Closed			
Oregon-California:	<i>Miles</i>	<i>Miles</i>	<i>Acres</i>	<i>Acres</i>	<i>Acres</i>
Klamath—					
Main division.....	132.00	8.00	4,000	35,800	38,000
Tule Lake division.....	114.00	-----	100	20,200	33,000
Langell Valley division.....	16.00	-----	600	6,800	6,800
South Dakota: Belle Fourche.....	201.40	1.98	10,000	24,500	25,000
Utah: Strawberry Valley ⁴	18.90	71.50	8,500	11,422	19,922
Washington:					
Yakima— ⁵					
Sunnyside division.....	89.81	93.30	9,000	54,276	54,276
Tieton division.....	7.50	2.30	200	2,400	2,400
Wyoming:					
Riverton.....	6.16	-----	25	4,550	4,550
Shoshone—					
Garland division.....	149.30	134.23	250	38,800	38,800
Frannie division.....	85.09	-----	1,800	11,500	11,500
Willwood division.....	17.67	.88	100	3,600	10,000
Total.....	2,745.40	497.90	136,754	874,630	929,280

¹ Surface drains and waste ditches not included.⁴ Constructed by landowners, water users, or drainage districts.⁵ All drainage work done by county drainage engineer through drainage improvement districts.

RECLAMATION TABLE 23.—Settlement and economic data, 1932

State and project	Irrigated farms		Towns		Number of schools	Number of churches	Banks			
	Number	Population	Number	Population			Number	Capital stock	Deposits	Number of depositors
Arizona: Salt River.....	7,500	55,000	12	90,000	86	70	8	\$2,170,000	\$18,212,406	20,000
Arizona-California: Yuma.....	1,729	3,940	5	9,625	14	25	1	50,000	(¹)	(¹)
California: Orland.....	698	1,873	1	1,200	9	10	2	190,000	952,400	3,674
Colorado:										
Grand Valley.....	460	1,281	6	15,315	24	36	4	365,000	4,000,000	9,000
Uncompahgre.....	1,710	5,554	3	7,100	27	27	4	385,000	2,526,600	11,250
Idaho:										
Boise.....	4,000	15,000	16	52,000	56	82	15	2,195,000	28,000,000	36,000
King Hill.....	189	586	3	1,550	5	5	1	20,000	282,700	1,050
Minidoka.....	2,285	6,957	6	7,450	22	50	5	200,000	1,372,000	3,600
Montana:										
Bitter Root.....	221	1,125	4	3,347	15	13	4	145,000	1,250,000	3,600
Hunley.....	638	1,752	5	5	7	6	1	25,000	122,300	400
Milk River.....	493	1,679	17	8,273	32	34	8	280,000	3,656,000	8,150
Sun River.....	487	1,079	6	464	10	10	3	70,000	105,000	904
Montana-North Dakota: Lower Yellowstone.....	514	1,709	8	3,095	17	20	4	139,500	578,000	2,550
Nebraska-Wyoming: North Platte:										
Interstate division.....	1,409	4,158	6	14,100	28	25	6	350,000	2,464,000	8,067
Fort Laramie division.....	1,289	5,243	10	6,487	36	20	5	148,000	1,488,000	5,240
Northport division.....	205	4,475	2	1,572	6	6	1	30,000	270,000	1,200
Nevada: Newlands.....	700	2,883	4	2,020	16	12	1	75,000	810,000	1,596
New Mexico: Carlsbad.....	502	2,418	4	5,100	8	11	1	96,000	561,000	1,400
New Mexico-Texas: Rio Grande.....	4,500	21,700	36	141,930	84	122	7	775,000	17,550,000	24,400
Oregon:										
Umatille—										
East division.....	293	920	2	1,055	3	4	1	25,000	205,000	1,200
West division.....	186	550	3	350						
Vale.....	84	260	3	1,122	3	5	1	50,000	222,500	500
Oregon-California: Klamath.....	781	3,555	5	16,809	29	16	5	515,000	4,843,400	12,854
South Dakota: Belle Fourche.....	802	2,270	5	3,129	28	17	2	100,000	2,000,000	4,000
Utah:										
Salt Lake Basin.....	2,100	9,600	10	46,000	44	48	9	1,475,000	17,600,000	8,500
Strawberry Valley.....	2,200	5,550	12	25,000	27	26	4	185,000	1,163,300	8,900
Washington:										
Okanogan.....	371	977	3	4,400	6	8	2	75,000	200,230	2,000
Yakima—										
Sunnyside.....	3,379	10,566	10	7,534	42	32	6	175,000	1,507,300	5,050
Tieton.....	1,330	4,204	8	28,100	12	11	1	15,000	65,500	1,000
Kittitas.....	600	2,200	5	8,100	22	16	6	375,000	3,986,600	10,128
Wyoming:										
Riverton.....	31	107	2	59	3	2				
Shoshone.....	882	2,110	5	1,450	3	9	2	45,000	400,000	1,350
Total.....	42,568	177,281	227	514,425	723	778	120	10,743,500	116,484,236	197,013

¹ Four other banks outside the division also serve the Tieton division. No data available.

¹ Bank closed Apr. 15, 1932.

	235,841	218,523	187,657	4,201,927	22 40	129,128	112,677	109,030	2,820,973	25.87
Nebraska-Wyoming:										
North Platte.....	113,098	103,143	90,427	1,620,252	18 02					
Pathfinder irrigation district.....	55,180	51,180	34,754	1,320,218	29 70					
Gering and Fort Laramie irrigation district.....	51,542	47,500	34,754	1,320,218	29 70					
Goshute irrigation district.....	16,170	14,700	11,296	176,347	18 61					
Northport irrigation district.....	87,500	42,703	40,203	742,703	30 26					
Nevada: Newlands.....	25,055	24,680	21,930	663,738	30 26					
New Mexico: Carlsbad.....	155,000	144,290	137,378	4,283,758	31 18	75,000	48,280	48,280	841,955	17.45
New Mexico-Texas:										
Rio Grande.....	88,000	79,215	77,636	2,384,279	30 71					
Elephant Butte irrigation district.....	16,000	13,069	12,596	251,380	19 96					
Rincon Valley, N. Mex.....	72,000	66,040	65,040	2,132,899	32 75					
Mesilla Valley, N. Mex.....	67,000	65,075	59,742	1,899,479	31 79					
El Paso County Water Improvement District No. 1.....	11,000	10,576	10,276	361,014	35 13					
Mesilla Valley, Tex.....	36,000	54,499	49,466	1,538,465	31 10					
El Paso Valley, Tex.....										
Oregon:										
Umatilla.....	14,562	11,486	11,143	172,762	15 50					
East division.....	8,572	7,459	7,222	104,389	14 45					
West division.....	5,990	4,027	3,921	68,373	17 44	781	684	675	12,274	18.00
Vale.....	7,872	2,131	1,963	55,003	27 97					
Oregon-California:										
Klamath.....	56,852	48,634	47,668	1,248,750	25 95	64,514	42,767	37,367	578,963	15.50
Main division.....	41,375	33,824	33,303	825,945	24 80					
Tule Lake division.....	15,477	14,810	14,365	422,805	29 40					
South Dakota: Belle Fourche.....	60,614	42,126	44,372	685,070	15 44					
Utah:										
Salt Lake Basin.....	43,180	41,185	36,608	837,180	22 87	77,000	67,000	67,000	2,137,000	31.90
Strawberry Valley.....	18,770	18,701	16,139	270,686	17 32	7,017	5,724	5,533	139,170	25.15
High Line division.....	14,864	13,942	12,629	323,844	25 64					
Spanish Fork division.....	9,546	8,542	7,840	233,650	29 80					
Springville-Mapleton division.....										
Washington:										
Okanogan.....	6,000	3,899	3,302	307,226	93 04					
Yakima.....	204,638	144,513	129,527	4,853,843	37 75	196,717	136,421	136,421	7,797,000	57.00
Sunnyside division.....	102,618	86,552	78,640	2,525,622	32 12					
Tieton division.....	30,040	25,800	21,170	1,920,856	90 73					
Kittitas division.....	72,000	32,131	29,717	437,365	14 72					
Wyoming:										
Shoshone.....	71,922	45,621	45,601	740,619	16 30					
Garland division.....	41,649	32,661	32,661	579,603	17 75					
Frankie division.....	20,063	9,473	9,453	136,070	14 39					
Willwood division.....	10,210	3,457	3,457	24,946	7 15					
Riverton.....	32,000	1,900	1,753	20,947	11 95	254	227	227	2,273	10.01
Total with irrigation.....	2,027,264	1,552,718	1,462,565	40,121,089	27 43	1,588,972	1,293,889	1,251,830	33,406,340	26.70

1 Data are for calendar year (irrigation season) except on Salt River project, where data are for corresponding "agricultural year," October, 1930, to September, 1931.

2 Areas for which bureau was prepared to supply water in 1931.

3 Bitter Root irrigation district being rehabilitated by United States under act of July 3, 1930.

4 Includes some dry-farmed tracts irrespective of the area given below under "Cropped without irrigation."

5 Includes some dry-farmed tracts.

RECLAMATION TABLE 25.—*Summary of crop results on reclamation projects in 1931*

[NOTE.—These detailed figures are limited to crops covered by census on Government projects proper, excluding all crops in areas served with water under the Warren Act, but including nonirrigated crops grown on the projects]

Crop	Acreage cropped		Yields		Crop value		
	Total	Per cent of cropped	Total	Average per acre	Average per acre	Total	Per cent of total value of all crops
Cereals:			<i>Bushels</i>				
Barley.....	84,828	5.5	2,850,918	33.6	\$12.10	\$1,021,710	2.5
Corn.....	74,369	4.9	1,831,062	24.6	11.30	838,158	2.1
Oats.....	40,987	2.7	1,524,502	37.2	10.50	431,821	1.1
Rye.....	2,427	.1	22,627	9.3	3.90	9,336	—
Wheat.....	102,406	6.8	2,508,025	24.5	11.70	1,202,176	3.0
Total.....	305,017	20.0	8,737,134	28.6	11.50	3,503,201	8.7
Other grain and seed:							
Alfalfa seed.....	26,209	1.7	82,403	3.1	13.60	357,224	.9
Clover seed.....	12,453	.8	40,432	3.2	13.20	164,645	.4
Flaxseed.....	1,533	.1	11,813	7.7	7.90	12,151	—
Total.....	40,195	2.6	134,648	3.4	13.30	534,020	1.3
Hay and forage:			<i>Tons</i>				
Alfalfa hay.....	481,116	31.6	1,167,491	2.4	17.70	8,543,436	21.2
Clover hay.....	16,581	1.1	20,028	1.2	7.30	120,989	.3
Other hay.....	53,569	3.5	67,500	1.3	7.10	381,705	.9
Corn fodder.....	12,844	.8	44,455	3.5	15.10	193,245	.5
Other forage.....	106,146	7.0	197,620	1.9	6.60	705,563	1.7
Pasture.....	423,726	28.0	—	—	6.20	2,608,188	6.4
Total.....	1,093,982	72.0	1,497,094	1.4	11.50	12,553,126	31.0
Vegetables and truck:			<i>Bushels</i>				
Beans.....	33,311	2.2	548,257	16.5	15.90	530,120	1.3
Onions.....	4,246	.3	612,874	144.4	111.70	474,863	1.2
Potatoes, white.....	76,399	5.0	13,576,154	177.8	37.00	2,824,482	7.0
Potatoes, sweet.....	1,649	.1	192,617	116.8	83.70	138,209	.3
Truck.....	58,101	3.8	—	—	87.20	5,060,325	12.5
Total.....	173,706	11.4	14,929,902	86.0	52.00	9,027,999	22.3
Fruits and nuts:			<i>Pounds</i>				
Apples.....	25,824	1.7	294,453,753	11,400	89.80	2,313,956	5.8
Peaches.....	3,783	.2	22,547,432	5,960	53.20	201,066	.5
Pears.....	6,919	.5	50,714,502	7,340	56.00	387,074	.9
Prunes.....	2,352	.1	9,945,043	4,230	45.60	107,105	.3
Citrus fruit.....	5,164	.3	51,548,490	9,980	148.20	766,581	1.9
Small fruit.....	2,140	.1	11,432,143	5,350	161.70	345,836	.8
Miscellaneous.....	6,322	.4	15,012,049	2,380	66.60	421,328	1.0
Total.....	52,504	3.4	455,653,412	8,680	86.50	4,542,946	11.2
Miscellaneous:			<i>Tons</i>				
Sugar beets.....	73,621	4.8	876,735	11.9	68.20	5,016,671	12.3
Cotton.....	163,461	10.7	1 139,463	.8	30.00	4,915,021	12.1
Cottonseed.....			59,862	.2			
Other crops.....	23,574	1.6	—	—	19.60	461,053	1.1
Total.....	260,656	17.1	—	—	24.50	10,392,745	25.5
Duplication.....	405,706	26.6	—	—	—	—	—
All crops for which detailed census was taken.....	1,520,354	100.0	—	—	26.70	40,554,037	100.0
Warren Act projects ³	1,251,830	—	—	—	26.70	33,406,340	—
Total.....	2,772,184	—	—	—	26.70	73,960,377	—

¹ Bales.² The dry-farmed area of this total amounted to 57,789 acres, with a total value of \$432,948.³ Totals only available. Acreage, yield, and value not compiled by crops.

RECLAMATION TABLE 26.—Irrigated and cropped acreage and crop values by years, 1906-1931

	Federal irrigation projects				Warren Act land				Entire area			
	Irrigated acreage	Cropped acreage	Crop value		Irrigated acreage	Cropped acreage	Crop value		Irrigated acreage	Cropped acreage	Crop value	
			For year	Cumulative total			For year	Cumulative total			For year	Cumulative total
1906	22,300	1,20,100	\$244,900	\$5,005,300	---	---	---	---	22,300	1,20,100	\$244,900	\$5,005,300
1907	187,600	1,169,000	4,760,400	12,581,100	---	---	---	---	187,600	1,169,000	4,760,400	12,581,100
1908	289,500	1,200,500	7,575,800	24,501,800	---	---	---	---	289,500	1,260,500	7,575,800	24,501,800
1909	410,600	1,369,500	11,920,700	37,476,000	---	---	---	---	410,600	1,369,500	11,920,700	37,476,000
1910	465,100	1,413,000	12,974,600	50,185,000	---	---	---	---	465,100	1,413,000	12,974,600	50,185,000
1911	541,400	1,470,100	12,708,600	64,010,400	---	---	---	---	541,400	1,470,100	12,708,600	64,010,400
1912	588,400	1,540,000	13,825,400	79,742,600	---	---	---	---	588,400	1,540,000	13,825,400	79,742,600
1913	699,200	1,642,200	15,732,200	96,218,100	---	---	---	---	699,200	1,642,200	15,732,200	96,218,100
1914	761,300	1,703,400	16,475,500	114,418,100	---	---	---	---	761,300	1,703,400	16,475,500	114,418,100
1915	814,900	1,760,000	18,200,000	147,234,100	---	---	---	---	814,900	1,760,000	18,200,000	147,234,100
1916	923,000	1,858,300	32,816,000	203,696,400	---	---	---	---	923,000	1,858,300	32,816,000	203,696,400
1917	1,037,500	1,966,800	56,462,300	270,517,800	---	---	---	---	1,037,500	1,966,800	56,462,300	270,517,800
1918	1,141,500	1,051,200	66,821,400	350,491,900	1,501,100	1,481,600	\$35,000,000	\$99,000,000	1,141,500	1,051,200	66,821,400	350,491,900
1919	1,187,300	1,113,500	88,974,100	425,663,000	916,300	880,600	64,000,000	146,505,800	2,103,600	1,966,800	101,821,400	458,491,900
1920	1,223,500	1,153,800	63,171,700	475,283,900	1,001,300	950,900	47,505,800	191,411,900	2,205,400	2,104,700	113,677,500	572,169,400
1921	1,227,500	1,157,900	49,620,300	525,644,800	1,001,300	969,600	44,906,100	224,652,700	2,228,800	2,127,500	94,525,400	666,695,800
1922	1,202,130	1,169,100	50,360,900	596,691,100	1,031,400	993,300	37,557,900	262,210,600	2,365,100	2,172,870	83,601,700	750,297,500
1923	1,213,700	1,179,870	63,036,300	659,691,100	1,036,700	889,500	43,237,500	305,448,100	2,221,600	2,106,100	109,726,100	862,627,800
1924	1,290,900	1,216,600	66,438,600	726,179,700	1,019,200	961,300	53,655,900	339,104,000	2,339,500	2,194,100	131,264,800	1,003,892,600
1925	1,326,300	1,242,800	77,668,900	795,453,500	1,037,200	949,600	49,750,000	408,854,000	2,527,100	2,311,100	110,414,900	1,114,307,500
1926	1,411,000	1,361,500	60,654,900	856,508,400	1,148,100	1,072,500	61,160,000	470,014,000	2,677,100	2,504,100	133,207,200	1,247,514,700
1927	1,379,000	1,431,600	72,047,200	928,555,600	1,235,000	1,192,000	62,495,300	532,509,300	2,677,100	2,681,200	143,573,100	1,391,087,800
1928	1,442,100	1,489,200	81,077,800	1,009,633,400	1,234,230	1,192,900	72,720,400	605,223,700	2,710,856	2,705,240	161,179,880	1,552,267,680
1929	1,483,900	1,512,250	88,459,390	1,098,092,790	1,286,046	1,254,493	54,654,550	659,884,340	2,738,836	2,805,460	119,661,820	1,671,929,500
1930	1,504,810	1,550,967	65,007,270	1,163,100,060	1,293,889	1,251,830	33,406,340	693,290,680	2,846,607	2,772,184	73,960,377	1,745,889,877
1931	1,552,718	1,520,354	40,554,037	1,203,654,097	---	---	---	---	---	---	---	---

1 Estimated.

RECLAMATION TABLES 27-29.—Crop reports on reclamation projects in 1931¹

NO. 27. AREA (ACRES)

State and project	Grain					Seed				Hay and forage							
	Barley	Corn	Oats	Rye	Wheat	Total	Alfalfa seed	Clover seed	Flax seed	Total	Alfalfa hay	Clover hay	Other hay	Corn fodder	Other forage	Pas- ture	Total
Arizona: Salt River-----	6, 385				12, 828	19, 213	6, 000				88, 046			2, 019	32, 669	131, 472	254, 206
Arizona-California: Yuma-----	449	13	27	18	1, 248	1, 755	13, 755				13, 755		11, 212		7, 388	4, 526	40, 267
Valley division-----	372	10	17	18	1, 202	1, 619	11, 456				11, 456		11, 212		4, 213		33, 801
Reservation division (Indian)-----		3	10		16	29	881				881				1, 229	75	2, 538
Bard division (White)-----	77				30	107	1, 418				1, 418				1, 950	233	3, 912
Yuma auxiliary (Mesa)-----																5	16
California: Orland-----	196	1, 166	36		94	1, 492					5, 927		107	30	16	4, 248	10, 328
Colorado: Orland-----	2, 142	10, 464	3, 717	19	8, 527	24, 869	153	357		510	28, 146	562	172	2, 744	3, 346	19, 509	54, 479
Grand Valley-----	2, 725	559			1, 332	4, 616	81			81	4, 103			2, 713	3, 309	838	10, 963
Uncompagre-----	2, 142	7, 739	3, 158	19	7, 195	20, 233	72	357		429	24, 043	562	172	31	37	18, 671	43, 516
Idaho: Boise-----	9, 889	6, 682	3, 459		19, 319	39, 349	2, 816	5, 717		8, 533	60, 025	5, 086	1, 407	842		23, 915	91, 275
New York irrigation district-----	852	12	377		1, 688	2, 929	33	223		256	6, 414	578	296	109		3, 848	11, 215
Nampa-Meridian irrigation district-----					3, 964	8, 111	346	1, 096		1, 442	14, 007	1, 161	238	242		7, 383	23, 631
Boise-Kuna irrigation district-----	2, 801	694	652														
Whiter irrigation district-----	2, 943	982	1, 054		6, 052	11, 031	124	1, 646		1, 770	18, 389	1, 457	734	224		6, 889	27, 693
Big Bend irrigation district-----	2, 723	4, 263	1, 164		6, 261	14, 411	2, 082	2, 044		4, 126	17, 922	1, 355	169	267		4, 846	24, 559
Black Canyon irrigation district-----	9	223	68		136	436	162	67		229	569	32				215	816
King Hill-----	561	508	144		1, 218	2, 431	69	641		710	2, 124	503				734	3, 361
Minidoka-----	3, 681	549	54		445	1, 416	402	77		479	2, 648	212	70	56		610	3, 596
Gravity division-----	4, 267	829	1, 907		7, 958	14, 961	515	4, 642		5, 157	35, 456	2, 920	233	114		11, 232	49, 955
Pumping division-----	2, 228	732	1, 324		3, 193	7, 472	458	1, 776		2, 234	21, 153	668	174	68		8, 055	30, 118
Montana: Bitter Root irrigation district ² -----	2, 044	97	583		4, 765	7, 489	57	2, 866		2, 923	14, 303	2, 252	59	46		3, 177	19, 837
Huntley-----	505		429	15	879	1, 828	53	20		73	4, 149	114	357	17	1, 108	6, 325	12, 070
Milk River-----	2, 169	242	808		762	3, 981	177	216		393	5, 097	198	254	51	5, 555	11, 849	22, 974
Malta division-----	2, 654	156	2, 913		3, 516	9, 239	1, 004	31	635	1, 670	13, 500	350	10, 002	286	6, 635	4, 463	31, 236
Glasgow division-----	2, 244	83	666		352	1, 345	248	56		304	4, 609		4, 591	133	2, 393	463	12, 239
Chinook division-----	45	6	182		1, 377	1, 610	529			829	2, 742		711	45	714		4, 212
Sun River-----	2, 365	67	2, 065		1, 787	6, 284	227	31	579	837	6, 149	350	4, 700	58	3, 528		14, 785
Fort Shaw division-----	2, 547	51	1, 652		13, 548	17, 798	78	481	360	919	10, 716	1, 561	1, 812	21		1, 323	15, 433
Greenfields and Big Coulee divisions-----	314	51	298		410	1, 073	60	47		107	4, 628	84	430	4		481	5, 627
	2, 233		1, 354		13, 138	16, 725	18	434	360	812	6, 088	1, 477	1, 382	17		842	9, 806

¹ Data are for calendar year (irrigation season) except on Salt River project, where data are for corresponding "agricultural year," October, 1930, to September, 1931.² Private irrigation district being rehabilitated by the United States under act of July 3, 1930.

RECLAMATION TABLES 27-29.—Crop reports on reclamation projects in 1931—Continued

NO. 27. AREA (ACRES)—Continued

State and project	Grain				Seed				Hay and forage								
	Barley	Corn	Oats	Rye	Wheat	Total	Alfalfa seed	Clover seed	Flax seed	Total	Alfalfa hay	Clover hay	Other hay	Corn fodder	Other forage	Pas- ture	Total
Montana-North Dakota:																	
Lower Yellowstone.....	3,813	1,522	1,193	70	878	7,476	53	49	364	466	6,215	243	1,585	459	137	1,963	10,602
District No. 1.....	2,557	1,057	713	27	613	4,967	3	40	194	237	4,751	173	1,222	430	137	1,114	7,827
District No. 2.....	1,256	1,465	480	43	2,059	2,569	50	9	170	229	21,464	70	363	29	---	849	2,775
Nebraska-Wyoming:																	
North Platte.....	25,014	32,872	7,590	1,202	2,436	69,114	68	305	4	377	42,769	1,252	1,528	479	34,126	9,568	89,722
Pathfinder irrigation district.....	11,901	18,751	2,752	812	727	34,973	---	---	---	---	21,820	794	---	479	10,820	5,171	39,084
Gering and Fort Laramie irri- gation district.....	6,969	6,153	2,867	---	983	16,972	24	305	---	329	10,925	43	277	---	12,378	1,761	25,384
Goshen irrigation district.....	5,234	3,476	1,499	---	294	10,503	---	---	---	---	8,356	320	1,150	---	9,595	1,938	21,359
Northport irrigation district.....	910	4,462	472	390	432	6,666	44	---	4	48	1,668	95	101	---	1,333	698	3,895
Nevada: Newlands.....	732	62	---	---	4,152	4,946	---	---	---	---	34,168	---	---	103	---	39,058	73,329
New Mexico: Carlsbad.....	59	179	607	10	80	935	522	---	---	522	3,896	522	---	179	113	187	4,897
New Mexico-Texas:																	
Rio Grande.....	861	11,061	603	4	987	13,516	221	---	---	221	28,770	---	889	798	2,033	2,367	34,857
Elephant Butte irrigation dis- trict.....	492	8,930	241	4	764	10,431	54	---	---	54	16,017	---	366	335	1,103	1,965	19,786
Rincon Valley, N. Mex.....	116	3,088	---	4	260	3,468	---	---	---	---	3,400	---	103	40	294	1,246	5,083
Mesilla Valley, N. Mex.....	376	5,842	241	---	504	6,963	54	---	---	54	12,617	---	263	295	809	719	14,703
El Paso Water Improvement District No. 1.....	369	2,131	362	---	223	3,085	167	---	---	167	12,953	---	523	463	930	402	15,071
Mesilla Valley, Tex.....	15	411	76	---	28	530	---	---	---	---	2,098	---	4	243	239	150	2,734
El Paso Valley, Tex.....	354	1,720	286	---	195	2,555	167	---	---	167	10,655	---	519	220	691	252	12,337
Oregon:																	
Umatilla.....	79	375	12	---	67	533	115	---	---	115	4,935	42	316	273	---	4,177	9,743
East division.....	55	112	5	---	36	208	---	---	---	---	3,127	---	140	204	---	3,026	6,497
West division.....	24	263	7	---	31	325	115	---	---	115	1,808	42	176	69	---	1,151	3,246
Vale.....	135	96	151	7	300	689	81	2	---	83	429	207	281	55	---	255	1,227
Oregon-California:																	
Klamath.....	2,065	1,198	271	1,896	5,430	---	38	---	38	38	13,400	35	3,596	---	---	16,941	33,972
Main division.....	470	159	177	1,288	2,094	---	38	---	38	38	7,380	35	2,508	---	---	14,947	24,870
Tule Lake division.....	1,595	---	94	608	3,336	---	---	---	---	---	6,020	---	1,088	---	---	1,994	9,102
South Dakota: Belle Fourche.....	4,976	2,448	2,415	1,534	11,502	42	51	25	---	118	12,046	315	3,311	3,938	---	6,604	26,214
Utah:																	
Strawberry Valley.....	1,378	228	1,011	---	4,973	7,590	22	2	---	20	16,455	42	233	---	---	4,631	28,483
High Line division.....	629	172	257	---	1,690	2,748	20	---	---	24	16,990	15	---	---	---	1,318	13,882
Spanish Fork division.....	596	34	560	---	2,142	3,332	2	---	---	4	4,912	24	137	---	---	2,195	9,516
Springville-Mapleton division.....	163	22	194	---	1,141	1,510	---	---	---	---	3,047	3	96	---	---	1,118	5,085
																	9,349

[illegible]

RECLAMATION TABLES 27-29.—Crop reports on reclamation projects in 1931—Continued

NO. 27. AREA (ACRES)—Continued

State and project	Vegetables and truck					Fruits and nuts								
	Beans	Onions	Potatoes (white)	Pota- toes (sweet)	Truck	Total	Apples	Peaches	Pears	Prunes	Citrus fruit	Small fruit	Miscel- laneous	Total
Arizona: Salt River.....		2, 229	182	929	37, 749	41, 089					3, 905	659	852	5, 416
Arizona-California:														
Yuma.....		171	22	28	4, 100	4, 321			7		926	63	144	1, 140
Valley division.....		171	22	27	4, 032	4, 252			7		28	30	144	209
Reservation division (Indian)					41	41								
Bard division (White).....					27	28								
Yuma auxiliary (Mesa).....											31	32		63
California: Orland.....					72	72	2	108		356	867	1		868
Colorado.....	2, 943	1, 132	6, 406		827	11, 308	981	266			333	197	2, 611	3, 611
Grand Valley.....	2, 315		1, 151		333	3, 799		189				77		1, 324
Uncompangre.....	628	1, 132	5, 255		494	7, 509	981	77				77		1, 135
Idaho:														
Boise.....	1, 206	406	4, 671		1, 196	7, 479	2, 453	192	64	1, 043		88		3, 840
New York irrigation district.....			11		42	53	180	3		191		1		375
Nampa Meridian irrigation district.....	226	152	738		256	1, 372	908	8	6	199		14		1, 135
Boise-Kuna irrigation district.....	182	68	806		697	1, 753	476	9	12	84		66		647
Wildier irrigation district.....	694	186	2, 923		201	4, 004	889	172	46	565		7		1, 679
Big Bend irrigation district.....	11		4			15				4				4
Black Canyon irrigation district.....														
King Hill.....	93		189			282								
Minidoka.....	744	22	413		83	1, 262	180	13		7		8		208
Gravely division.....	6, 183	15	19, 383		921	26, 502	52					20	65	137
Pumping division.....	4, 824	9	10, 065		654	15, 552	52					20	65	137
Montana:														
Bitter Root irrigation district 1.....	401		104		313	818	1, 585					2	28	1, 615
Huntley.....	2, 702		80		137	2, 919								
Milk River.....	158	2	1, 039		117	1, 316								
Malta division.....	24	1	192		62	279								
Glasgow division.....	27		59		19	105								
Chinook division.....	107	1	788		36	932								
Sun River.....	361		500		115	976								
Fort Shaw division.....	34		396		83	513								
Greenfields and Big Coulee divisions.....	327		104		32	463								
Montana-North Dakota:														
Lower Yellowstone.....	2, 109		308		228	2, 645						3		3
District No. 1.....	1, 797		211		162	1, 170						3		3
District No. 2.....	1, 312		97		66	1, 475								
Nebraska-Wyoming:														
North Platte.....	4, 630	26	21, 104		652	26, 412								
Pathfinder irrigation district.....	1, 784		12, 915		314	15, 013								

Gering and Fort Laramie irrigation district.....	1, 924	26	5, 970	206	8, 126	454	84	499	257	20	1, 314
Goshute irrigation district.....	708	114	1, 943	114	2, 765	381	8	24	139	9	552
Northport irrigation district.....	214	4	156	18	508	276	4	24	130	20	522
Nevada: Newlands.....				503	663	663	76	475	17	27	735
New Mexico: Carlsbad.....				81	81	81	69	475	101	20	755
New Mexico: Texas:											
Rio Grande.....	359	75	15	692	4, 992	454	84	499	257	20	1, 314
Elephant Butte irrigation district.....	325	69	15	283	3, 033	381	8	24	139	9	552
Rincon Valley, N. Mex.....	185	1	1	50	3, 692	17	4	24	130	20	522
Mesilla Valley, N. Mex.....	140	68	15	233	2, 577	364	4	24	130	20	522
El Paso Water Improvement District No. 1.....	34	6	6	409	1, 969	73	76	475	17	27	735
Mesilla Valley, Tex.....	7			62	510	4	6	475	101	20	755
El Paso Valley, Tex.....	27	6		347	1, 518	69	70	475	27	5	118
Oregon:											
Umatilla.....			214	431	645	113	11		27	5	118
East division.....			103	244	347	113	11		22	33	
West division.....			111	187	298						
Vale.....	62	120	13	22	217						
Oregon-California:											
Klamath.....			7, 341	887	8, 228						
Main division.....			5, 877	424	6, 301						
Tule Lake division.....			1, 464	463	1, 927						
South Dakota: Belle Fourche.....	292		191	240	723						
Utah:											
Strawberry Valley.....	113	42	420	1, 580	2, 155	194	457	6	87	285	1, 037
High Line division.....	103	16	272	283	676	55	65		13	94	227
Spanish Fork division.....	5		83	542	630	38	66		2	15	121
Springville-Mapleton division.....	3	26	65	755	849	101	326	6	72	176	689
Washington:											
Okonogan.....			4	50	54	3, 149		39	9	8	3, 205
Yakima.....	162	2	9, 926	2, 538	12, 648	16, 622	2, 652	6, 300	643	2, 076	29, 221
Sunnyside division.....			7, 554	2, 443	9, 997	6, 314	1, 172	4, 078	620	736	11, 655
Tieton division.....			38	753	10, 275	1, 480	202	202	20	1, 340	17, 527
Kittitas division.....	162	2	1, 657	77	1, 898	33	12	1	3		49
Wyoming:											
Shoshone.....	10, 730		3, 874	200	14, 804	39					39
Garland division.....	9, 806		3, 422	18	13, 346	39					39
Framme division.....	516		322	73	911						
Willwood division.....	408		130	9	547						
Riverton.....	156		26	38	220						
Total with irrigation.....	33, 311	4, 246	76, 392	1, 649	173, 690	25, 824	3, 783	6, 919	2, 352	5, 164	6, 322
Cropped without irrigation.....											
Milk River (Glasgow division).....			7	9	16						
Total without irrigation.....			7	9	16						
Grand total.....	33, 311	4, 246	76, 399	1, 649	173, 706	25, 824	3, 783	6, 919	2, 352	5, 164	6, 322
											52, 504

1 Data are for calendar year (irrigation season) except on Salt River project where data are for corresponding "agricultural year," October, 1930, to September, 1931.

2 Private irrigation district being rehabilitated by the United States under act of July 3, 1930.

RECLAMATION TABLES 27-29.—Crop reports on reclamation projects in 1931—Continued

NO. 27. AREA (ACRES)—Continued

State and project	Miscellaneous				Total cropped	Irrigated, no crop						Grand total irrigated	
	Sugar beets	Cotton	Other	Total		Dupli- cated	Young alfalfa	Young fruit	Fall plowing	Miscel- laneous	Dupli- cated		Total irrigated without crop
Arizona: Salt River.....	---	43,323	18	43,341	160,719	208,546	7,624	---	---	---	---	7,624	216,170
Arizona-California:	---	---	---	---	---	---	---	---	---	---	---	---	---
Yuma.....	---	19,896	61	19,957	30,672	50,523	632	2,393	979	3,820	5,172	2,652	53,175
Valley division.....	---	15,772	53	15,825	25,988	41,174	554	2,271	934	3,368	5,042	2,085	43,253
Reservation division (Indian).....	---	1,846	6	1,852	1,752	3,589	12	15	15	27	27	3,616	3,616
Bard division (White).....	---	2,278	---	2,278	2,932	4,874	38	122	28	100	107	181	3,055
Yuma auxiliary (Mesa).....	---	---	2	2	---	886	28	---	2	---	---	23	1,245
California: Orland.....	---	---	42	42	2,807	12,738	689	299	---	235	66	1,157	13,895
Colorado.....	2,882	---	1,146	4,028	20,628	75,910	1,610	31	7,229	456	8,621	705	76,615
Grand Valley.....	994	---	731	1,725	6,134	623	1,610	31	229	406	663	595	15,834
Uncompagre.....	1,888	---	415	2,303	14,494	60,651	987	31	7,000	50	7,958	110	60,761
Idaho:	---	---	---	---	---	---	---	---	---	---	---	---	---
Boise.....	---	---	8,379	8,379	4,953	153,902	1,194	215	1,824	11,431	2,975	11,689	165,591
New York irrigation district.....	---	---	5	5	160	14,673	35	14	331	1,571	366	1,885	16,258
Nampa-Meridian irrigation district.....	---	---	1,479	1,479	855	36,315	320	23	483	2,035	813	2,058	38,373
Boise-Kuna irrigation district.....	---	---	1,404	1,404	394	43,904	287	23	471	2,185	758	3,185	47,089
Wildor irrigation district.....	---	---	5,232	5,232	2,946	51,065	557	178	504	4,556	998	4,577	53,642
Big Bend irrigation district.....	---	---	239	239	191	1,568	15	---	25	85	40	85	1,653
Black Canyon irrigation district.....	---	---	---	---	407	6,377	---	---	---	199	---	199	6,576
King Hill.....	---	---	58	58	143	6,876	509	31	136	75	509	106	6,982
Minidoka.....	3,155	---	---	3,155	1,083	98,784	2,799	78	78	5,875	1,980	6,772	105,556
Gravity division.....	1,265	---	---	1,265	33	56,745	819	78	---	2,895	---	3,792	60,537
Pumping division.....	1,890	---	---	1,890	1,050	42,039	1,980	---	---	2,980	1,980	2,980	45,019
Montana:	---	---	---	---	---	---	---	---	---	---	---	---	---
Bitter Root irrigation district ²	582	---	582	582	3,014	13,972	38	347	25	914	1,324	---	13,972
Huntley.....	5,555	---	---	5,555	12,693	23,129	---	---	---	---	---	---	23,122
Milk River.....	3,795	---	---	3,795	4,566	42,690	2,770	---	5,484	40	7,462	832	43,522
Malta division.....	1,214	---	---	1,214	1,316	14,065	1,037	---	189	---	---	293	14,358
Glasgow division.....	58	---	58	58	588	5,923	105	---	642	40	682	105	6,031
Chinook division.....	2,523	---	---	2,523	2,662	22,699	1,628	---	4,653	---	5,847	434	23,133
Sun River.....	107	---	107	107	17	35,216	---	---	---	---	---	31,297	31,297
Fort Shaw division.....	107	---	107	107	17	7,410	---	---	---	---	---	37,369	37,369
Greenfields and Big Coulee divisions.....	---	---	---	---	---	27,806	---	---	---	---	---	23,928	23,928
Montana-North Dakota:	---	---	---	---	---	---	---	---	---	---	---	---	---
Lower Yellowstone.....	10,002	---	---	10,002	---	31,194	---	---	40	---	40	40	31,234
District No. 1.....	7,207	---	---	7,207	---	21,411	---	---	40	---	---	21,451	21,451
District No. 2.....	2,795	---	---	2,795	---	9,783	---	---	---	---	---	9,783	9,783
Nebraska-Wyoming:	---	---	---	---	---	---	---	---	---	---	---	---	---
North Platte.....	34,126	---	4,869	38,995	36,963	187,657	---	---	---	---	---	30,866	218,523
Pathfinder irrigation district.....	10,820	---	1,357	12,177	10,820	90,427	---	---	---	---	---	14,716	105,143

RECLAMATION TABLES 27-29.—Crop reports on reclamation projects in 1931—Continued

NO. 28.—YIELDS

State and project	Grain					Seed		
	Barley	Corn	Oats	Rye	Wheat	Total	Alfalfa seed	Clover seed
	<i>Bushels</i>	<i>Bushels</i>	<i>Bushels</i>	<i>Bushels</i>	<i>Bushels</i>	<i>Bushels</i>	<i>Bushels</i>	<i>Bushels</i>
								Flax seed
								<i>Bushels</i>
								Total
								<i>Bushels</i>
Arizona: Salt River.....	266,040	565	1,000	720	384,840	630,880	19,000	19,000
Arizona-California: Yuma.....	7,244	540	250	720	21,187	30,716	48,120	48,120
Valley division.....	5,552	25	750		20,727	27,739	40,507	40,507
Reservoir division (Indian).....					367	2,059	2,198	2,198
Bard division (White).....	1,692						5,415	5,415
Yuma auxiliary (Mesa).....	2,968	32,220	530		1,274	56,992		
California: Orland.....		61,310	13,705		29,732	104,747	143	143
Colorado: Grand Valley.....	69,888	227,313	88,755	475	198,944	585,405	221	1,486
Uncompahgre.....								
Idaho: Boise.....	379,942	188,473	147,658		653,037	1,369,110	6,158	17,991
New York irrigation district.....	28,399	10	14,901		45,636	88,946	66	550
Nampa-Meridian irrigation district.....	115,808	20,795	30,340		138,783	305,726	697	3,396
Boise-Kuna irrigation district.....	108,289	17,503	41,733		208,145	375,670	349	4,832
Wildor irrigation district.....	105,916	125,043	53,626		215,595	500,180	4,448	6,961
Big Bend irrigation district.....	450	8,115	2,447		4,855	15,867	772	311
Black Canyon irrigation district.....	21,080	17,007	4,611		40,023	82,721	137	2,200
King Hill.....	11,408	1,296	1,296		8,900	36,427	212	1,579
Minidoka.....	162,094	30,209	71,269		243,256	506,858	1,913	14,904
Gravity division.....	81,536	27,604	48,326		95,796	253,262	1,628	8,505
Pumping division.....	80,538	2,005	22,973		147,460	283,596	285	8,027
Montana: Bitter Root ?.....	9,716		14,699	170	17,978	42,563	156	50
Huntley.....	59,320	5,491	28,164		16,158	109,133	394	1,087
Milk River.....	76,039	4,307	102,078		46,720	229,144	1,647	6,220
Malta division.....	6,431	2,530	25,126		1,335	35,422	491	180
Glasgow division.....	1,205	70	3,282		12,158	16,715	661	671
Chinook division.....	68,403	1,707	73,670		33,227	177,007	495	59
Sun River.....	54,492	731	42,247		166,648	264,118	95	6,040
Fort Shaw division.....	8,009	731	7,795		6,501	23,036	62	2,386
Greenfields and Big Coulee divisions.....	46,483		34,452		160,147	241,082	33	2,117
Montana-North Dakota: Lower Yellowstone.....	77,079	31,351	31,981	1,490	13,022	154,923	79	232
District No. 1.....	49,789	23,550	16,815	1,290	8,186	98,630	9	196
District No. 2.....	27,290	7,801	15,166	1,200	4,836	56,293	70	36
Nebraska-Wyoming: North Platte.....	724,805	621,200	238,713	5,017	27,814	1,617,549	189	10
Pathfinder irrigation district.....	313,297	305,660	72,125	2,586	4,269	700,937		209

Gering and Fort Laramie irrigation district.....	251,570	165,429	102,425	-----	12,018	531,442	10	-----	95
Goshute irrigation district.....	139,865	79,187	47,738	-----	5,976	272,766	-----	-----	-----
Northport irrigation district.....	20,073	67,924	16,425	2,431	-----	112,404	104	-----	114
Nevada: Newlands.....	16,000	4,523	22,823	200	2,155	89,376	1,100	-----	1,100
New Mexico: Carlsbad.....	1,421	-----	-----	-----	-----	31,124	-----	-----	-----
New Mexico-Texas:									
Rio Grande.....	28,012	328,931	22,854	80	23,296	403,223	935	-----	935
Elephant Butte irrigation district.....	18,217	268,383	9,421	80	18,613	314,724	90	-----	90
Rincon Valley, N. Mex.....	3,085	80,731	-----	80	5,246	39,142	-----	-----	-----
Mesilla Valley, N. Mex.....	15,132	187,662	9,421	-----	13,367	225,582	90	-----	90
El Paso County Water Improvement District No. 1.....	9,795	60,588	13,433	-----	4,683	88,499	845	-----	845
Mesilla Valley, Tex.....	225	22,489	5,800	-----	887	29,401	-----	-----	-----
El Paso Valley, Tex.....	9,570	38,099	7,633	-----	3,796	59,098	845	-----	845
Oregon:									
Umatilla.....	1,318	9,989	430	-----	1,610	13,347	160	-----	160
East division.....	578	2,940	300	-----	830	4,698	-----	-----	-----
West division.....	740	6,999	130	-----	780	8,649	160	-----	160
Vale.....	2,771	1,389	2,351	14	3,433	9,958	84	25	109
Oregon-California:									
Klamath.....	87,363	-----	67,610	1,751	46,634	203,348	-----	192	192
Main division.....	8,553	-----	6,960	1,081	30,014	46,608	-----	192	192
Tule Lake division.....	78,800	-----	60,650	670	16,620	156,740	-----	-----	-----
South Dakota: Belle Fourche.....	79,411	32,734	49,840	2,377	16,850	181,212	58	117	232
Utah:									
Strawberry Valley.....	51,901	6,483	36,861	-----	138,828	234,073	52	22	74
High Line division.....	18,749	4,520	8,903	-----	39,021	71,193	40	-----	40
Spanish Fork division.....	25,858	980	20,295	-----	66,964	114,097	12	22	34
Springville-Mapleton division.....	7,294	983	7,663	-----	32,843	48,783	-----	-----	-----
Washington:									
Okanogan.....	-----	35	-----	-----	-----	35	-----	-----	-----
Yakima.....	114,108	201,620	251,782	-----	241,442	808,852	-----	-----	-----
Sunnyside division.....	17,389	191,669	69,768	-----	124,513	403,339	-----	-----	-----
Tieton division.....	7,770	9,791	3,771	-----	10,190	31,522	-----	-----	-----
Kititas division.....	88,949	60	178,243	-----	106,739	373,991	-----	-----	-----
Wyoming:									
Shoshone.....	71,512	2,910	59,689	340	41,121	175,572	426	1,779	821
Garland division.....	58,132	1,215	34,027	340	29,414	123,128	33	376	621
Frammie division.....	8,803	1,695	17,289	-----	8,060	35,847	373	93	663
Willwood division.....	4,577	-----	-----	-----	3,647	16,597	20	1,310	200
Riverton.....	2,096	3,860	4,934	250	551	11,691	150	42	310
Total with irrigation.....	2,356,938	1,831,062	1,301,329	12,884	2,418,163	7,920,376	82,363	40,432	134,358
<i>Cropped without irrigation</i>	-----	-----	-----	-----	-----	-----	-----	-----	-----
Milk River (Glasgow division).....	-----	-----	-----	-----	1,200	1,200	40	-----	40
Sun River (Greenfields and Big Coulee divisions).....	493,830	-----	223,173	9,743	10,812	10,812	-----	250	250
Klamath.....	493,980	-----	223,173	9,743	77,850	804,596	-----	-----	-----
Total without irrigation.....	-----	-----	-----	-----	80,862	816,758	40	-----	290
Grand total.....	2,850,918	1,831,062	1,524,502	22,627	2,508,025	8,737,134	82,403	40,432	134,648

¹ Data are for calendar year (irrigation season) except on Salt River project where data are for corresponding "agricultural year," October, 1930, to September, 1931.

² This district being rehabilitated pursuant to act of July 3, 1930.

RECLAMATION TABLES 27-29.—Crop reports on reclamation projects in 1931—Continued

NO. 28.—YIELDS—Continued

State and project	Hay and forage					Vegetables and truck					
	Alfalfa hay	Clover hay	Other hay	Corn fodder	Other forage	Total	Beans	Onions	White potatoes	Sweet potatoes	Total
	Tons	Tons	Tons	Tons	Tons	Tons	Bushels	Bushels	Bushels	Bushels	Bushels
Arizona: Salt River.....	280,733	-----	-----	-----	-----	345,079	-----	-----	-----	-----	-----
Arizona-California: Yuma Valley division.....	27,297	-----	8,687	22,209	42,137	7,821	-----	-----	-----	-----	137,437
Reservation division (Indian)	23,596	-----	8,687	-----	5,830	43,812	-----	-----	-----	-----	1,930
Bard division (White)	1,382	-----	-----	-----	660	38,113	-----	-----	-----	-----	3,650
Yuma auxiliary (Mesa)	2,308	-----	-----	-----	1,338	2,042	-----	-----	-----	-----	-----
California: Orland.....	11	167	-----	176	160	3,646	-----	-----	-----	-----	-----
Colorado:	-----	-----	-----	-----	-----	22,022	-----	-----	-----	-----	-----
Grand Valley.....	10,127	-----	-----	-----	-----	10,127	40,117	-----	159,381	-----	199,498
Uncompahgre.....	44,365	533	200	202	296	45,596	7,663	345,770	961,534	-----	1,314,967
Idaho:	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Boise.....	125,886	7,928	1,744	4,060	-----	139,618	14,729	186,144	892,303	-----	1,093,176
New York irrigation district.....	9,957	7,709	288	757	-----	11,711	-----	-----	10,911	-----	10,911
Nampa-Meridian irrigation district.....	30,578	1,646	322	1,180	-----	33,726	2,575	82,521	147,118	-----	232,214
Boise-Kuna irrigation district.....	34,648	1,820	905	719	-----	38,092	2,933	19,995	115,088	-----	138,016
Wildier irrigation district.....	42,013	3,130	229	1,404	-----	46,776	7,781	83,628	571,646	-----	663,055
Big Bend irrigation district.....	1,713	49	-----	-----	-----	1,762	164	-----	1,400	-----	1,564
Black Canyon irrigation district.....	6,977	574	105	112	-----	7,551	1,276	-----	46,140	-----	47,416
King Hill.....	7,944	395	250	561	-----	8,556	9,149	3,960	50,386	-----	63,495
Minidoka.....	94,317	5,337	1,774	407	-----	100,465	114,665	3,700	3,431,509	-----	3,549,874
Gravity division.....	58,396	1,774	150	407	-----	60,727	85,805	2,050	1,523,038	-----	1,610,896
Pumping division.....	35,921	3,563	100	154	-----	39,738	28,860	1,650	1,908,471	-----	1,938,981
Montana:	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Bitter Root 1.....	7,873	181	342	73	5,980	14,449	5,839	-----	13,307	-----	19,146
Huntley.....	12,706	179	237	118	64,035	77,275	58,112	-----	6,195	-----	64,307
Milk River.....	24,866	348	7,012	895	43,609	76,720	1,616	250	180,743	-----	182,609
Malta division.....	8,989	-----	2,795	574	13,588	25,946	1,179	125	32,891	-----	33,195
Glasgow division.....	4,766	-----	510	148	1,061	6,495	200	-----	4,984	-----	5,184
Chinook division.....	11,101	348	3,707	173	28,960	44,289	1,237	125	142,868	-----	144,230
Sun River.....	17,702	1,844	1,426	31	-----	21,003	6,033	-----	49,677	-----	55,710
Fort Shaw division.....	6,977	95	374	14	-----	7,460	93	-----	37,356	-----	37,449
Greenfields and Big Coulee divisions.....	10,725	1,749	1,052	17	-----	13,543	5,940	-----	12,321	-----	18,261
Montana-North Dakota:	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Lower Yellowstone.....	11,973	183	1,468	664	216	14,504	18,764	-----	44,230	-----	62,994
District No. 1.....	9,400	140	1,125	629	216	11,510	7,288	-----	28,665	-----	35,953
District No. 2.....	2,573	43	343	35	-----	2,994	11,476	-----	15,565	-----	27,041
Nebraska-Wyoming:	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
North Platte.....	72,951	1,055	996	1,756	-----	76,758	65,988	6,436	3,394,597	-----	3,467,021
Patchfinder irrigation district.....	33,411	618	-----	1,756	-----	35,785	24,302	-----	2,000,350	-----	2,084,652

Gering and Fort Laramie irrigation district.....	22,892	45	208				23,145	33,872	6,436	1,046,334	1,086,642
Goshen irrigation district.....	14,278	338	732					6,085			259,323
Northport irrigation district.....	2,370	54	56					1,729			30,319
Nevada: Newlands.....	72,227		754	318			72,545		220	5,566	5,786
New Mexico: Carlsbad.....	14,204				135		15,389				
Rio Grande.....	91,543		1,808	3,705	8,785		105,841	3,418	8,702	903	95,327
Elephant Butte irrigation district.....	50,917		668	1,631	5,300		58,576	3,254	7,792	903	36,484
Mincon Valley, N. Mex.....	9,747		159	65	820		10,791	1,669	35		2,383
Mesilla Valley, N. Mex.....	41,170		509	1,566	4,540		47,785	1,585	7,757	903	32,397
El Paso County Water Improvement District No. 1.....	40,626		1,140	2,074	3,425		47,265	1,164	910		57,769
Mesilla Valley, Tex.....	7,590		10	1,622	940		10,162	60			58,843
El Paso Valley, Tex.....	33,036		1,130	452	2,485		37,103	104	910		4,406
Oregon: Umatilla.....	11,655	52	388	1,974			14,069			21,541	21,541
East division.....	7,392		178	1,510			9,280			10,720	10,720
West division.....	4,063	52	210	464			4,780			10,821	10,821
Vale.....	954	129	319	91			1,493	83	41,053	1,485	42,621
Oregon-California: Klamath.....	43,342	74	5,417				48,833				1,717,797
Main division.....	21,178	74	3,517				24,769				1,346,467
Tule Lake division.....	22,164		1,900				24,064				1,346,467
South Dakota: Belle Fourche.....	14,893	306	2,326	5,488			23,013	1,991		20,400	371,330
Utah: Strawberry Valley.....	32,121	123	294		1,105		33,643	1,156	6,998	50,360	58,514
High Line division.....	15,831	35	155		133		15,999	1,099	5,578	29,740	36,417
Spanish Fork division.....	9,969	80	139		481		10,685	18		9,050	9,708
Springville-Mapleton division.....	6,321	8			491		6,959	39	1,420	10,930	12,389
Washington: Okanogan.....	112		96	11	75		294			217	217
Yakima.....	115,311	139	12,702	1,404	11,236		140,792	2,451	350	2,050,323	2,053,124
Sunnyside division.....	96,635		2,987	1,237	6,013		106,872			1,570,865	1,570,865
Tieton division.....	6,680		722	128	579		8,109			143,000	143,000
Kittitas division.....	11,996	139	8,993	39	4,644		25,811	2,451	350	336,458	339,259
Wyoming: Goshute.....	9,512	993	629	306	11,896		23,336	195,620		498,415	694,035
Shoshone.....	5,721	803	604	30	15		7,173	182,329		466,758	649,087
Garland division.....	3,210	23	6	50	11,881		15,170	7,768		20,203	27,971
Frankie division.....	481	107	19	226			693	5,523		11,453	16,977
Willwood division.....	626	62	28	3			721	863		3,052	3,915
Riverton.....	1,166,749	20,028	47,228	44,453	197,405		1,475,953	548,257	612,874	13,575,404	14,929,152
Total with irrigation.....											
Cropped without irrigation.....											
Milk River (Glasgow division).....	341		147	2	125		615			750	750
San River (Greenfields and Big (onlee divisions).....	94		7				101				
Klamath.....	307		20,118				20,425				
Total without irrigation.....	742		20,272	2	125		21,141			750	750
Grand total.....	1,167,491	20,028	67,500	44,455	197,020		1,497,094	548,257	612,874	13,576,154	14,929,902

1 Data are for calendar year (irrigation season) except on Salt River project where data are for corresponding "agricultural year," October, 1930, to September, 1931.

2 This district being rehabilitated pursuant to act of July 3, 1930.

RECLAMATION TABLES 27-29.—Crop reports on reclamation projects in 1931—Continued

NO. 29 VALUE

State and project	Grain						Seed			
	Barley	Corn	Oats	Rye	Wheat	Total	Alfalfa seed	Clover seed	Flax seed	Total
Arizona: Salt River.....	\$127,700				\$265,540	\$393,240	\$74,100			\$74,100
Arizona-California: Yuma.....	2,834	\$538			12,675	16,799	204,564			204,564
Valley division.....	2,082	513	80	\$432	12,943	15,460	170,807			170,807
Reservation division (Indian).....		25	240	462	87	352	9,763			9,763
Bard division (White).....	752				245	997	23,994			23,994
California: Orland.....	1,336	26,110	212		764	28,422				
Colorado: Grand Valley.....		39,852	3,711		12,277	55,840	686			686
Uncompahgre.....	35,282	126,865	29,407	456	94,572	286,552	2,210	\$7,022		9,232
Idaho: Boise.....	102,154	72,290	35,664		250,239	460,347	22,494	69,572		92,066
New York irrigation district.....	7,585	3	3,583		17,400	28,571	257	1,980		2,237
Nampa-Meridian irrigation district.....	29,921	8,007	7,015		52,936	97,969	2,635	13,647		16,282
Boise-Kuna irrigation district.....	23,228	5,829	10,016		79,095	124,178	1,256	16,139		17,395
Wildier irrigation district.....	28,079	49,607	13,004		84,662	175,352	16,128	25,752		41,880
Big Bend irrigation district.....	135	3,652	587		1,821	6,195	1,660	880		2,540
Black Canyon irrigation district.....	7,196	5,102	1,459		14,325	28,062	558	11,174		11,732
King Hill.....	5,134	6,670	415		4,005	16,224	7,382	1,145		8,527
Minidoka.....	66,458	22,657	19,251		109,465	217,831	8,034	71,539		79,573
Gravity division.....	33,429	20,703	13,048		43,108	110,288	6,837	33,069		39,846
Pumping division.....	33,029	1,954	6,203		66,357	107,543	1,197	38,530		39,727
Montana: Bitter Root ?.....	5,525		4,620	102	10,391	20,638	1,560	300		1,860
Hundley.....	21,355	2,196	7,041		6,463	37,055	2,935	1,304		4,239
Milk River.....	49,425	2,584	46,956		35,040	134,005	12,847	212	\$6,202	19,261
Malta division.....	4,180	1,518	11,558		1,001	18,257	3,590		162	3,992
Glasgow division.....	783	42	1,510		9,119	11,454	5,156			5,156
Chinook division.....	44,402	1,024	33,888		24,920	104,294	3,861	212		10,113
Sun River.....	26,156	409	13,520		84,926	125,011	3,681	5,917		8,575
Fort Shaw division.....	3,844	409	2,495		3,251	9,999	443			1,128
Greenfields and Big Coulee divisions.....	22,312		11,025		81,675	115,012	238	5,232		7,447
Montana-North Dakota: Lower Yellowstone.....	15,416	15,675	4,797	298	6,511	42,697	379	556		3,584
District No. 1.....	9,958	11,775	2,522	58	4,093	28,406	43	470		1,352
District No. 2.....	5,458	3,900	2,275	240	2,418	14,291	336	86		1,830
Nebraska-Wyoming: North Platte.....	189,647	254,805	59,186	1,003	8,113	512,754	1,134	30	5	1,169
Pathfinder irrigation district.....	81,457	126,551	18,031	1,517	1,281	227,837				
Gering and Fort Laramie irrigation district.....	65,408	67,826	25,606		3,605	162,445	510	30		540

Goshen irrigation district.....	37,764	33,258	11,935	1,673	84,630	5	629
Northport irrigation district.....	3,018	27,170	3,614	486	1,554	624	
Nevada: Newlands.....	8,832	27,450			63,832		3,958
New Mexico: Carlisbad.....	853	2,534	7,303	200	12,054	3,958	
New Mexico-Texas:							
Rio Grande.....							
Elephant Butte irrigation district.....	13,311	151,834	7,545	40	182,937	6,240	6,240
Rincon Valley, N. Mex.....	8,619	118,874	2,525	40	137,819	545	545
Mesilla Valley, N. Mex.....	1,874	36,141		40	40,535		
El Paso County Water Improvement District No. 1.....	6,745	82,733	2,525		97,284	545	545
Mesilla Valley, Tex.....	4,692	32,960	5,020		45,118	5,695	5,695
El Paso Valley, Tex.....	100	11,652	1,964		14,150		
El Paso Valley, Tex.....	4,592	21,308	3,056		30,968	5,695	5,695
Oregon:							
Umatilla.....	476	5,843	150		7,260	981	981
East division.....	260	2,093	102		2,829		
West division.....	216	3,750	48		4,431	981	981
Vale.....	1,386	764	1,018	11	5,068	431	25
Oregon-California:							
Klamath.....	35,815		18,254	876	80,198	1,152	1,152
Main division.....	3,507		1,879	541	92,135	1,152	1,152
Tule Lake division.....	32,308		16,375	335	57,993		
South Dakota: Belle Fourche.....	27,794	18,004	12,460	832	67,178	406	814
Utah:							
Strawberry Valley.....	18,166	4,279	11,058		102,917	360	447
Hickline division.....	6,562	2,983	2,671		31,726	280	280
Spanish Fork division.....	9,050	647	6,088		49,265	80	167
Springville-Mapleton division.....	2,554	649	2,299		21,926		
Washington:							
Okanogan.....		35			35		
Yakima.....	41,716	81,588	70,581		299,476		
Sunnyside division.....	6,086	76,668	20,930		159,715		
Tieton division.....	2,719	4,896	980		13,690		
Kittitas division.....	32,911	24	48,671		126,071		
Wyoming:							
Shoshone.....	21,454	1,018	16,714	102	55,737	4,802	862
Farland division.....	17,440	4,425	9,528		39,261	1,015	652
Framme division.....	2,641	593	4,841	102	11,299	3,251	210
Willwood division.....	1,373		2,345		5,177	3,586	
Riverton.....	943	1,158	1,382	112	3,926	1,706	99
Total with irrigation.....						225	
	819,168	838,138	371,565	4,464	3,227,993	164,645	533,433
<i>Cropped without irrigation</i>							
Milk River (Glasgow division).....					900	312	312
Sun River (Greenhills and Big Coulee divisions).....	72				5,856		275
Klamath.....	202,470		60,256	4,872	268,722		
Total without irrigation.....	202,542		60,256	4,872	275,208	312	275
Grand total.....	1,021,710	838,138	431,821	9,336	3,503,201	164,645	534,020

1 Data are for calendar year (irrigation season) except on Salt River project where data are for corresponding "agricultural year," October, 1930, to September, 1931.

2 This district being rehabilitated pursuant to act of July 3, 1930.

RECLAMATION TABLES 27-29.—Crop reports on reclamation projects in 1931—Continued

No. 29 VALUE—Continued

State and project	Hay and forage						Vegetables and truck					
	Alfalfa hay	Clover hay	Other hay	Corn fodder	Other forage	Pasture	Total	Beans	Onions	White potatoes	Sweet potatoes	Truck
Arizona: Salt River.	\$2,245,808								\$40,122	\$12,740	\$97,545	\$3,559,980
Arizona-California:												
Yuma.				\$77,739	\$406,867	\$1,257,448	\$3,987,915					
Valley division.	136,593		\$17,878		53,084	36,304	243,859		8,375	225	1,915	492,755
Reservation division (Indian).	115,998		17,878		42,762	30,798	207,436		8,375	225	1,915	443,270
Bard division (White).	1,977				3,643	616	12,236					431,630
Yuma auxiliary (Mesa).	12,563				6,679	4,590	23,882				94	550
Yuma auxiliary (Mesa).	55						355					669
California: Orland.	161,392		1,503	1,320	1,200	27,610	193,025					2,500
Colorado:												
Grand Valley.	75,132			8,142	5,500	5,780	94,554	\$41,324		58,227		28,577
Uncompahgre.	347,952	\$3,546	1,244	606	1,480	42,204	397,332	6,897	226,027	197,892		53,721
Idaho:												
Boise.	902,179	48,814	9,011	12,598		214,659	1,187,261	14,985	139,109	224,453		45,383
New York irrigation district.	71,681	4,318	1,485	2,312		30,917	110,713			2,635		1,403
Nampa-Meridian irrigation district.	230,360	10,548	1,712	4,669		65,953	313,242	2,732	59,960	41,949		11,077
Boise-Kuna irrigation district.	242,536	10,930	4,661	2,157		68,890	329,174	2,658	16,343	27,776		26,838
Wildor irrigation district.	296,768	18,782	1,153	3,490		37,314	357,477	7,290	62,806	142,776		6,065
Big Bend irrigation district.	11,994	294				2,150	14,438			336		218,937
Black Canyon irrigation district.	48,840	3,942				9,435	62,217	2,079		7,981		10,060
King Hill.	63,552	3,160	840	448		6,710	74,710	13,822	2,970	15,116		38,272
Minidoka.	660,219	37,359	1,750	2,805		104,817	806,950	85,908	3,700	446,095		45,097
Gravity division.	408,772	12,418	1,050	2,035		73,922	498,197	64,833	2,050	197,994		580,890
Pumping division.	251,447	24,941	700	770		30,895	308,753	21,645	1,650	248,101		294,850
Montana:												
Bitter Root 2.	76,965	1,590	3,242	283	4,742	23,447	110,269	10,069		3,327		17,057
Hundley.	88,939	895	1,184	235	16,010	28,375	135,638	35,395		1,858		6,624
Milk River.	237,459	3,132	80,404	6,713	39,867	1,349	368,924	2,909	525	90,371		113,176
Nalta division.	89,890		33,540	4,305	16,684	1,349	145,768		300	16,445		8,885
Glasgow division.	47,660		6,120	1,110	5,249		60,139	360		2,492		1,451
Chinook division.	99,909	3,132	40,744	1,298	17,934		163,017		225	71,434		82,921
Sun River.	141,616	11,064	8,553	173		9,924	171,330	9,014		19,871		10,835
Fort Shaw division.	55,816	570	2,241	78		3,609	62,314	112		14,943		39,730
Greenfields and Big Coulee divisions.	85,801	10,494	6,312	95		6,315	109,016	8,902		4,928		22,555
Montana-North Dakota:												
Lower Yellowstone.	71,838	549	4,404	997	25,653	6,048	109,480	17,208		8,846		15,907
District No. 1.	56,400	420	3,375	944	18,666	3,156	82,961	6,601		5,733		12,872
District No. 2.	15,438	129	1,029	53	6,987	2,892	26,528	10,517		3,113		16,665
Nebraska-Wyoming:												
North Platte.	401,271	2,509	5,976	1,756	46,069	21,784	479,365	59,389	5,792	574,489		33,160
Pathfinder irrigation district.	183,760	1,236		1,756	14,607	14,153	215,512	21,872		350,260		387,852

Gering and Fort Laramie irrigation district.....	125,906	90	1,248	17,948	3,377	148,569	30,485	5,792	177,877	10,300	224,454
Goshute irrigation district.....	78,529	1,075	4,392	11,514	3,068	98,568	5,476	---	41,492	6,290	53,228
Northport irrigation district.....	13,076	108	336	2,000	1,196	16,716	1,556	---	4,800	900	7,316
Nevada: Newlands.....	577,816	---	---	795	---	629,441	---	250	3,507	38,408	42,165
New Mexico: Carlisbad.....	120,734	---	3,770	888	1,870	127,600	---	---	---	6,075	6,075
New Mexico-Texas:											
Rio Grande.....	732,308	---	8,445	11,217	23,651	814,342	4,100	7,895	38,749	269,198	320,679
Elephant Butte irrigation district.....	407,300	---	3,074	5,123	18,192	465,079	3,883	7,254	737	154,453	181,441
Mesilla Valley, N. Mex.....	70,178	---	803	2,771	9,150	84,483	2,079	20	1,823	17,410	21,257
Mesilla Valley, N. Mex.....	337,182	---	2,271	4,852	9,033	370,594	1,804	7,234	737	137,043	160,184
El Paso County Water Improvement District No. 1.....	325,008	---	5,371	6,094	5,469	359,263	217	641	23,635	114,745	139,238
Mesilla Valley, Tex.....	60,720	---	65	4,676	2,563	74,772	92	---	2,780	28,509	31,381
El Paso Valley, Tex.....	264,288	---	5,306	1,418	10,573	284,491	125	641	20,855	86,236	107,857
Oregon:											
Umatilla.....	69,681	252	2,342	6,078	34,165	112,518	---	---	7,770	30,736	38,506
East division.....	45,552	---	1,068	4,530	26,411	77,561	---	---	3,216	12,498	15,714
West division.....	24,129	252	1,274	1,548	7,754	31,967	---	---	4,554	18,238	22,792
Vale.....	6,843	445	2,253	409	1,279	11,207	135	36,000	407	1,670	38,272
Oregon-California:											
Klamath.....	303,304	518	29,794	18,146	218,146	551,552	---	---	515,339	100,279	615,618
Main division.....	148,246	318	19,344	17,631	176,631	344,739	---	---	403,940	53,979	457,919
Tule Lake division.....	155,148	10,450	41,451	207,113	59,436	286,834	5,475	---	111,399	46,300	137,690
South Dakota: Belle Fourche.....	148,930	2,754	20,934	54,880	59,436	286,834	---	---	13,800	14,248	35,023
Utah:											
Strawberry Valley.....	265,116	617	1,472	8,285	35,441	310,881	3,469	3,849	12,590	106,085	125,993
Highline division.....	126,648	175	---	2,176	18,057	147,052	3,299	3,068	7,435	17,762	31,564
Spanish Fork division.....	84,737	402	777	3,565	11,477	100,958	53	---	2,423	39,650	42,126
Springville-Mapleton division.....	53,731	40	695	2,494	5,911	62,871	117	781	2,732	48,673	52,303
Washington:											
Okanogan.....	1,344	---	1,152	83	3,036	---	---	---	97	2,500	2,597
Yakima.....	638,473	695	61,376	4,283	324,777	1,076,077	3,738	249	503,777	220,241	727,998
Sunnyside division.....	531,493	---	11,948	33,072	216,855	797,079	---	---	377,008	211,946	588,954
Tieton division.....	46,760	---	4,332	320	17,600	71,907	---	---	35,750	2,850	38,600
Kitutas division.....	60,220	695	45,096	252	10,506	90,322	3,738	249	91,012	5,445	100,444
Wyoming:											
Shoshone.....	57,069	2,482	1,570	765	31,063	102,722	215,261	---	109,647	10,034	330,942
Garland division.....	34,326	2,008	1,509	75	18,370	63,092	203,576	---	102,687	6,160	308,420
Framme division.....	13,200	57	15	125	8,913	31,340	4,766	---	4,945	3,643	14,850
Willwood division.....	3,483	417	4	565	8,780	8,291	4,926	---	2,515	231	7,672
Riverton.....	4,382	310	177	24	4,648	9,551	992	---	1,37	3,135	5,440
Total with irrigation.....	8,537,125	120,989	269,250	183,240	704,407	2,571,778	530,120	474,863	2,824,107	5,059,890	9,027,189
<i>Cropped without irrigation</i>											
Milk River: Glasgow division.....	3,410	---	1,764	15	1,156	6,345	---	---	375	435	810
Sun River: Greenfields and Big Coulee divisions.....	2,149	---	110,649	42	36,241	149,039	---	---	---	---	---
Klamath.....	6,311	---	112,455	15	1,15	153,743	---	---	375	475	810
Total without irrigation.....	8,543,436	120,989	381,705	193,245	705,563	2,608,188	530,120	474,863	2,824,482	5,060,326	9,027,969
Grand total.....											

¹ Data are for calendar year (irrigation season) except on Salt River project where data are for corresponding "agricultural year," October, 1930, to September, 1931.

² This district being rehabilitated pursuant to act of July 3, 1930.

RECLAMATION TABLE 27-29.—Crop reports on reclamation projects in 1931—Continued

NO. 29 VALUE—Continued

State and project	Fruits and nuts							Miscellaneous				Grand total	
	Apples	Peaches	Pears	Prunes	Citrus fruit	Small fruit	Miscellaneous	Total	Sugar beets	Cotton	Other		Total
Arizona: Salt River.													
Arizona-California:													
Yuma.													
Valley division.													
Reservation division (Indian).													
Bard division (White).													
Yuma auxiliary (Mesa).													
California: Orland.	\$100	\$2,536	120	\$3,424	93,075	140	5,000	98,215		41,569	105	41,674	98,570
Colorado:													
Grand Valley.		4,833											
Uncompahgre.	30,293	6,119											
Idaho:													
Boise.	42,854	13,917	3,516	60,714									
New York irrigation district.	1,850	25		10,740									
Nampa-Meridian irrigation district.	20,739	360	175	14,020									
Boise-Kuna irrigation district.	5,915	375	628	5,265									
Wildier irrigation district.	14,350	13,157	2,713	30,569									
Big Bend irrigation district.				120									
Black Canyon irrigation district.													
King Hill.	8,559	755		101									
Mindoka.	450												
Gravity division.													
Pumping division.													
Montana:													
Bitter Root ?.	60,030												
Huntley.													
Milk River.													
Malta division.													
Glasgow division.													
Chinook division.													
Sun River.													
Fort Shaw division.													
Greenfields and Big Coulee divisions.													
Montana-North Dakota:													
Lower Yellowstone.													
District No. 1.													
District No. 2.													
Nebraska-Wyoming:													
North Platte.													
Pathfinder irrigation district.													

RECLAMATION TABLE 30.—*Summary of livestock and equipment on Federal irrigation projects, 1931*

	Number	Value	
		Each	Total
Horses.....	69,988	\$37. 70	\$2,638,686
Purebred sire ¹	1	4,000.00	4,000
Mules.....	9,788	55.00	573,840
Beef cattle.....	87,692	26.54	2,327,568
Purebred sires.....	769	83.64	64,322
Scrub sires.....	179	44.33	7,935
Dairy cattle.....	143,144	42.76	6,121,758
Purebred sires.....	1,676	88.00	147,216
Scrub sires.....	1,209	38.24	46,238
Sheep.....	483,698	3.00	1,452,784
Hogs.....	109,172	5.24	571,886
Brood sows.....	17,032	12.00	201,989
Goats.....	154	13.70	2,109
Rabbits.....	128	.80	1,033
Fowls.....	2,113,604	.80	1,696,792
Bees (hives).....	34,892	4.27	149,044
Total stock value.....			16,007,200
Value of equipment:			
Motor vehicles.....			7,126,616
Other equipment.....			5,972,155
Total value of equipment.....			² 13,098,771
Total stock and equipment value.....			29,105,971
Decrease in value over 1930:			
Stock.....			5,906,164
Equipment.....			2,796,542
Total decrease.....			8,702,706

¹ On Bitter Root project.² Value of equipment on Salt River project estimated.

RECLAMATION TABLE 31.—*Inventory of livestock and equipment on reclamation project farms at close of 1931*¹

State and project	Horses			Mules			Beef						
	Num-ber	Value		Num-ber	Value		Cattle		Purebred sires		Scrub sires		
		Each	Total		Each	Total	Num-ber	Value		Num-ber	Value		
								Each	Total		Each	Total	Each
Arizona: Salt River.....	6, 096	\$50. 00	\$304, 800	2, 835	\$65. 00	\$184, 275	15, 159	\$37. 50	\$508, 462				
Arizona-California:													
Yuma.....	1, 990	43. 00	85, 544	1, 210	56. 70	68, 605	1, 160	22. 69	26, 320				
Valley and Reservation divisions.....	1, 934	42. 51	83, 489	1, 202	56. 74	68, 205	1, 160	22. 69	26, 320				
Auxiliary (Mesa).....	26	79. 04	2, 055	8	50. 00	400							
California: Orland.....	650	40. 78	26, 510				509	15. 00	7, 636				
Colorado:													
Grand Valley.....	1, 012	38. 03	38, 486	58	54. 65	3, 170	34	22. 03	749				
Uncompahgre.....	4, 207	30. 65	128, 966	203	36. 79	7, 470	7, 413	22. 62	167, 709	82	\$66. 58	\$5, 400	\$785
Idaho:													
Boise.....	7, 390	34. 08	251, 888	141	51. 45	7, 255	1, 991	21. 93	43, 661	24	75. 00	1, 800	355
New York irrigation district.....	18, 605	31. 14	580, 400	3	70. 00	210	342	16. 45	5, 626	1	75. 00	75	125
Boise-Kuna irrigation district.....	2, 209	33. 67	74, 385	36	37. 92	1, 365	598	19. 72	11, 795	10	50. 00	500	100
Nampa-Meridian irrigation district.....	1, 728	39. 56	68, 359	10	45. 00	450	637	22. 46	14, 304	3	73. 33	220	20
Wildier irrigation district.....	2, 540	31. 25	79, 384	68	60. 59	4, 120	414	28. 83	11, 936	10	100. 50	1, 005	110
Big Bend irrigation district.....	81	31. 49	2, 550	2	25. 00	50							
Black Canyon irrigation district.....	227	36. 87	8, 370	22	48. 20	1, 060							
King Hill.....	461	24. 50	11, 294	29	45. 25	1, 312	515	18. 85	9, 708	12	77. 00	924	50
Mindoka.....	5, 478	33. 70	184, 579	89	50. 90	4, 530	10, 587	18. 29	10, 587	4	41. 75	167	254
Gravity division.....	3, 220	31. 68	102, 014	62	51. 20	3, 175	419	15. 36	6, 437	4	41. 75	167	254
Pumping division.....	2, 258	36. 56	82, 565	27	50. 18	1, 355	160	25. 94	4, 130				
Montana:													
Bitter Root ¹	625	43. 57	27, 233	42	49. 29	2, 070	922	24. 61	22, 695	3	90. 00	270	215
Hundley.....	1, 834	28. 72	52, 608	56	44. 91	2, 515	1, 629	26. 74	43, 560				
Milk River.....	2, 164	36. 10	78, 135	43	40. 70	1, 750	8, 571	28. 00	238, 510	106	112. 40	11, 915	1, 676
Malta and Glasgow divisions.....	767	40. 31	30, 910	7	24. 29	170	6, 422	29. 88	191, 875	93	121. 08	11, 260	1, 311
Chinook division.....	1, 397	33. 80	47, 225	36	43. 88	1, 580	2, 149	21. 70	46, 635	13	50. 38	655	365
Sun River.....	1, 276	29. 44	36, 570	10	21. 50	215	3, 345	29. 35	98, 176	42	120. 70	5, 070	315
Fort Shaw division.....	482	27. 83	13, 415	4	25. 00	100	636	27. 14	17, 260	5	82. 00	410	235
Greenfields and Big Coulee divisions.....	794	29. 16	23, 155	6	19. 16	115	2, 709	29. 86	80, 916	37	125. 96	4, 660	80
Montana-North Dakota:													
Lower Yellowstone.....	1, 948	30. 40	59, 217	41	49. 76	2, 040	1, 678	29. 19	48, 973	27	92. 26	2, 491	375
District No. 1.....	1, 398	28. 96	41, 887	25	41. 60	1, 040	1, 532	29. 35	44, 958	22	99. 00	2, 180	375
District No. 2.....	550	31. 51	17, 330	16	62. 50	1, 000	146	27. 50	4, 015	5	62. 20	311	

¹ Data are for calendar year, except on Salt River project, where data are for corresponding "agricultural year," October, 1930, to September, 1931.

² Bitter Root irrigation district being rehabilitated under the act of July 3, 1930.

State and project

State and project	Cattle				Purebred sires				Scrub sires				Value				Value			
	Num-ber	Value		Num-ber	Value		Num-ber	Value		Num-ber	Value		Num-ber	Value		Num-ber	Value			
		Each	Total		Each	Total		Each	Total		Each	Total		Each	Total		Each	Total		
Arizona: Salt River	21,764	\$50.00	\$1,190,336							29,328	\$4.00	\$117,312	5,859	\$7.00	\$41,013					
Arizona-California:																				
Yuma	1,171	70.11	82,100	34	\$89.55	\$3,045	6	\$55.83	\$335	2,623	6.45	10,936	1,012	7.49	7,584	58	\$23.41	\$1,358		
Valley and Reservation divisions	1,164	70.00	81,490	34	89.55	3,045	6	55.83	335	2,623	6.45	10,936	1,012	7.49	7,584	58	23.41	1,358		
Auxiliary (Mesa)	7	87.14	610																	
California: Orland	4,082	62.85	256,548	97	87.27	8,465	57	48.16	2,745	4,450	4.26	18,938	1,505	5.91	8,899	337	17.55	5,916		
Colorado:																				
Grand Valley	1,305	35.69	46,584							865	2.38	2,062	2,105	5.88	12,381					
Uncompangue	4,828	34.63	167,219	60	58.02	3,505	46	32.39	1,490	34,096	3.79	129,196	6,825	5.47	37,331	1,346	11.40	15,341		
Idaho:																				
Boise	26,175	31.93	835,847	429	66.41	28,491	385	32.38	12,467	21,476	2.91	62,438	16,976	4.84	82,240	4,574	11.45	52,378		
New York irrigation district	3,457	29.93	103,472	41	78.41	3,215	57	35.28	2,011	5,023	3.29	6,688	1,074	4.51	4,842	241	11.15	2,689		
Boise-Kuna irrigation district	8,529	30.01	255,950	130	55.25	7,183	145	30.19	4,378	5,525	2.41	13,306	5,833	4.50	26,240	1,422	11.91	16,939		
Nampa-Meridian irrigation district	7,677	33.41	256,481	132	70.69	10,745	97	34.45	3,342	4,519	3.41	15,395	3,426	5.09	17,446	943	13.07	12,324		
Wildor irrigation district	5,859	33.71	197,535	92	71.66	6,593	75	31.68	2,376	8,535	2.91	24,863	5,947	5.10	30,317	1,582	10.84	17,153		
Big Bend irrigation district	204	36.61	7,469	4	50.00	200				379	2.31	874	199	4.88	971	64	14.63	936		
Black Canyon irrigation district	449	33.27	14,940	10	55.50	555	11	32.73	360	485	2.71	1,312	497	4.88	2,424	322	7.27	2,340		
King Hill	691	27.75	27,500	9	61.44	580	15	27.00	405	486	4.00	1,944	928	4.21	3,907	123	12.00	1,476		
Mindoka	8,536	32.16	274,539	96	50.41	4,840	28	31.96	895	20,139	2.37	47,782	6,709	4.70	31,544	1,566	9.10	15,625		
Gravity division	5,341	29.54	157,785	71	45.14	3,205	28	31.96	895	12,989	2.35	30,557	2,840	4.85	13,792	586	8.56	15,022		
Pumping division	3,195	36.54	116,754	25	65.40	1,635				7,150	2.41	17,225	3,869	4.59	17,752	980	10.82	10,603		
Montana:																				
Bitter Root	2,707	32.96	89,286	56	105.98	5,935	26	30.58	795	11,724	4.36	51,060	2,144	4.88	10,471	316	14.16	4,473		
Huntley	2,458	29.93	73,575	18	76.40	1,375	45	61.44	2,765	3,913	3.21	12,571	2,668	5.08	13,559	583	12.50	6,178		
Milk River	2,350	42.00	98,715	18	76.40	1,375	27	82.00	2,160	60,799	3.03	211,898	3,262	5.74	18,722	124	10.60	6,178		
Malta and Glasgow divisions	1,007	54.34	54,720							2,160	42.301	3.26	137,875	1,233	7.99	9,854	583	12.50	6,178	
Chinook division	1,343	32.76	43,995	13	63.46	825	18	33.61	605	27,498	2.69	74,023	2,029	4.37	8,868	459	10.00	4,591		
Sun River	1,717	39.73	68,215	33	81.06	2,675	16	30.00	573	19,485	2.52	49,202	2,505	4.68	11,735	512	11.66	5,971		
Fort Shaw division	1,766	40.91	72,340	14	72.14	1,010	12	38.58	463	2,633	2.58	6,815	2,716	4.90	3,509	97	14.70	1,425		
Greenfields and Big Coulee divisions	951	38.77	36,875	19	87.63	1,665	4	27.50	110	16,852	2.51	42,387	1,789	4.60	8,226	415	10.95	4,546		
Montana-North Dakota:																				
Lower Yellowstone	2,248	27.56	61,956	20	88.25	1,765	4	30.00	120	5,285	2.96	15,653	3,416	3.87	13,240	284	8.41	2,389		
District No. 1	1,554	30.60	47,549	14	109.28	1,530	4	30.00	120	1,344	2.38	3,199	2,153	4.13	8,883	155	9.06	1,404		
District No. 2	694	20.76	14,407	6	39.17	235				3,941	3.16	12,454	1,263	4.45	4,357	129	7.63	9,935		

1 Data are for calendar year, except on Salt River project, where data are for corresponding "agricultural year," October, 1930, to September, 1921.

2 Includes \$102,136, the value of 12,016 heifers.

3 Bitter Root irrigation district being rehabilitated under the act of July 3, 1930.

4 Horses and mules.

RECLAMATION TABLE 31.—Inventory of livestock and equipment on reclamation project farms at close of 1931—Continued

State and project	Cattle						Dairy				Sheep				Hogs						
	Value		Purebred sires		Scrub sires		Value		Number		Value		Number		Value		Number		Value		
																					Value
	Num-ber	Each	Total	Num-ber	Each	Total	Num-ber	Each	Total	Num-ber	Each	Total	Num-ber	Each	Total	Num-ber	Each	Total			
Nebraska-Wyoming:																					
North Platte.....	9,422	35.01	329,899	88	82.40	7,280	69	31.23	2,155	5,111	2.35	12,016	22,181	4.08	90,677	2,720	8.00	21,747			
Pathfinder irrigation district.....	4,808	35.00	168,280	50	75.00	3,750	29	25.00	725	1,670	2.00	3,340	9,869	3.00	29,607	1,054	5.00	5,270			
Gering and Fort Laramie irrigation district.....	2,229	34.56	77,047	18	87.50	1,575	25	41.00	1,040	1,776	2.01	3,586	5,201	5.32	27,676	573	10.42	5,972			
Goshen irrigation district.....	1,703	40.00	68,120	18	100.00	1,800	14	25.00	350	1,570	3.00	4,710	5,079	5.00	25,395	823	10.00	8,250			
Northport irrigation district.....	682	24.12	16,452	2	62.50	125	1	4.00	40	95	4.00	380	2,032	3.93	7,999	270	8.43	2,275			
Nevada:.....	8,048	47.00	378,343	157	129.27	19,390	181	44.01	7,965	25,559	1.70	44,171	2,152	5.38	11,577	407	12.00	5,164			
New Mexico: Carlsbad.....	563	68.30	38,450							681	5.25	3,577	182	13.43	2,445						
New Mexico-Texas:																					
Rio Grande.....	6,505	70.66	459,675	84	168.50	14,154	20	45.00	900	11,567	2.54	29,414	3,267	8.66	28,302	189	22.24	4,203			
Elephant Butte irrigation district.....	3,588	67.50	242,190	39	131.51	5,129	10	33.50	335	5,536	2.41	8,516	1,927	7.98	15,336	115	18.88	2,185			
El Paso County Water Improvement District No. 1.....	2,917	74.56	217,485	45	200.55	9,025	10	56.50	565	8,031	2.60	20,898	1,340	9.68	12,966	74	27.27	2,018			
Oregon:																					
Umatilla.....	3,150	45.22	142,459	23	60.40	1,389	8	41.25	330	6,055	3.20	19,316	1,367	6.88	9,401	110	14.00	1,515			
East division.....	2,196	45.20	99,249							3,633	3.60	13,000	830	7.82	6,496						
West division.....	954	45.30	43,210	23	60.40	1,389	8	41.25	330	2,422	2.60	6,316	537	5.41	2,905	110	14.00	1,515			
Vale.....	273	39.41	10,700							270	71	3.13	222	245	5.45	1,355	52	13.02	677		
Oregon-California:																					
Klamath.....	5,483	48.64	266,716	97	114.00	11,050	42	51.74	2,173	71,152	3.12	222,361	4,365	7.17	31,331	751	17.89	13,434			
Main division.....	4,181	48.00	202,575	84	115.00	9,660	36	55.00	1,968	52,952	3.20	169,061	2,348	7.40	17,277	370	17.70	6,540			
Tule Lake division.....	1,032	49.00	64,141	13	107.00	1,390	6	34.00	205	18,200	2.93	53,300	2,017	7.00	14,054	381	18.00	6,894			
South Dakota: Belle Fourche.....	3,626	30.00	108,780	41	66.09	2,710	17	33.82	575	64,926	2.75	178,546	3,976	4.00	15,904	441	7.72	3,407			
Utah: Strawberry Valley.....	4,122	20.00	82,440							31,959	2.00	63,918	1,937	5.00	9,685	380	8.00	3,040			
Washington:																					
Okanogan.....	280	39.11	10,950	1	200.00	200	1	50.00	50	7	2.50	17	88	7.90	695	9	14.78	133			
Yakima.....	19,325	49.00	948,149	327	91.62	29,902	232	43.36	9,000	22,938	4.25	97,502	12,370	5.70	70,553	2,204	16.50	36,279			
Sunnyside division.....	14,674	47.79	701,340	226	96.37	21,690	168	39.77	6,682	16,765	3.75	62,840	9,565	5.49	52,567	1,509	17.16	25,865			
Tieton division.....	1,685	53.00	89,310	18	77.22	1,396	32	39.12	1,252	51	3.24	165	1,025	6.22	6,374	240	15.08	3,613			
Kittitas division.....	2,966	51.42	152,499	83	82.92	6,882	32	35.19	1,126	6,122	5.64	34,497	1,770	6.56	11,012	455	14.88	6,771			
Wyoming:																					
Shoshone.....	1,924	37.90	72,897	4	66.37	265	7	24.28	170	19,203	2.56	49,261	1,023	6.33	6,482	36	22.20	799			
Garland division.....	1,378	35.85	49,405	3	55.00	165	4	23.85	95	12,122	2.46	29,832	498	6.79	3,382	36	12.20	439			
Frankie division.....	420	44.03	18,495							6,282	2.79	17,544	412	2.11	2,562						
Willwood division.....	126	39.66	4,997	1	100.00	100	3	25.00	75	799	2.36	1,885	113	4.76	538	36	10.00	360			
Riverton.....	91	53.53	4,870	1	45.00	45				400	3.68	1,471	105	8.31	873	34	14.29	486			
Total and average.....	143,144	42.76	6,121,758	1,676	88.00	147,216	1,209	38.24	46,238	483,698	3.00	1,452,784	109,172	5.24	571,886	17,032	12.00	201.98			

State and project	Fowls			Bees (hives)			Total stock value	Value of equipment		Total equipment	Total stock and equipment	Increase or decrease in value over 1930		
	Number	Value		Num-ber	Value			Motor vehicles	Other			Stock	Equip-ment	Total
		Each	Total		Each	Total								
Arizona: Salt River.....	314, 282	\$0. 74	\$232, 232	7, 111	\$3. 00	\$21, 333	\$2, 659, 763	\$500, 000		\$1, 000, 000	\$3, 659, 763	-\$1, 745, 827	-\$1, 995, 827	
Arizona-California: Yuma.....	48, 755	. 81	39, 544	4, 805	5. 05	24, 265	349, 636	284, 870	241, 521	526, 391	876, 027	-79, 899	-248, 986	
Valley and Reservation divisions.....	47, 845	. 80	38, 687	4, 805	5. 05	24, 265	345, 714	264, 645	228, 946	839, 305	839, 305	-79, 163	-240, 956	
Auxiliary (Mesa).....	47, 910	. 94	45, 087	4, 805	5. 05	24, 265	3, 922	20, 225	12, 575	32, 500	36, 722	-736	-8, 766	
California: Orland.....	86, 866	1. 92	166, 881	485	3. 96	1, 919	4 504, 537	141, 316	50, 005	231, 321	735, 858	-44, 817	-54, 054	
Colorado: Grand Valley.....	17, 181	. 62	10, 654	134	2. 68	359	114, 445	65, 065	93, 377	155, 442	272, 887	-23, 843	-29, 853	
Uncompahgre.....	79, 510	. 61	48, 757	1, 723	2. 73	4, 705	717, 934	100, 611	257, 788	418, 399	1, 136, 333	-51, 680	-204, 554	
Idaho: Boise.....	226, 035	. 64	143, 226	261	2. 48	648	1, 523, 194	510, 518	362, 287	872, 805	2, 395, 999	-1, 012, 885	-188, 188	
New York irrigation district.....	16, 424	. 70	11, 530	9	3. 00	27	159, 347	49, 138	1, 555	50, 723	210, 070	-116, 339	-16, 719	
Boise-Kuna irrigation district.....	60, 926	. 62	37, 616	82	3. 62	145	449, 902	125, 490	50, 144	206, 634	653, 536	-296, 653	-156, 421	
Nampa-Meridian irrigation district.....	62, 309	. 60	37, 695	18	2. 67	48	436, 829	122, 028	83, 679	203, 707	642, 536	-389, 798	-43, 092	
Wildier irrigation district.....	78, 799	. 67	52, 874	152	2. 82	428	428, 694	198, 727	179, 089	377, 816	806, 510	-164, 362	-71, 104	
Big Bend irrigation district.....	2, 550	. 77	1, 976	1	9. 6	96	13, 026	4, 135	1, 215	5, 350	20, 376	-8, 576	-1, 150	
Black Canyon irrigation district.....	5, 027	. 40	2, 035	350	5. 00	1, 750	33, 396	11, 000	16, 575	27, 575	60, 971	-37, 107	-36, 910	
King Hill.....	14, 144	. 55	7, 978	332	2. 50	849	68, 828	19, 418	33, 840	53, 258	122, 086	-35, 389	-26, 249	
Mimboka.....	70, 268	. 49	38, 829	332	2. 50	849	615, 020	475, 462	176, 385	1, 266, 877	278, 445	-60, 355	-338, 500	
Gravity division.....	38, 712	. 48	18, 007	332	2. 50	849	342, 759	297, 432	50, 000	347, 432	690, 191	-131, 909	-18, 710	
Pumping division.....	40, 556	. 49	20, 222				272, 261	178, 030	126, 395	304, 425	576, 686	-146, 536	-41, 645	
Montana: Bitter Root.....	10, 898	. 50	5, 431	222	2. 87	630	6 224, 574	53, 555	4, 155	57, 710	282, 284	-188, 604	-35, 245	
Hundley.....	23, 945	. 54	13, 046	1, 153	2. 61	3, 008	214, 442	130, 690	26, 210	156, 900	371, 342	-84, 203	-152, 430	
Milk River.....	21, 851	. 69	15, 022	120	8. 12	974	687, 635	159, 000	199, 370	358, 370	1, 046, 005	-283, 670	-57, 067	
Malta and Glasgow divisions.....	12, 608	. 82	10, 325	98	8. 48	830	453, 427	82, 655	116, 355	199, 010	652, 437	-117, 273	-34, 435	
Chinook division.....	9, 243	. 51	4, 697	22	6. 54	144	234, 208	76, 345	83, 015	159, 360	393, 568	-171, 397	-22, 032	
Sun River.....	25, 400	. 70	17, 933	757	4. 50	3, 816	300, 466	114, 235	120, 815	255, 050	535, 516	-61, 624	-27, 265	
Fort Shaw division.....	12, 000	. 77	9, 884	575	4. 78	2, 751	88, 617	29, 710	32, 975	151, 302	369, 930	-10, 220	-88, 889	
Greenfields and Big Coulee divisions.....	12, 491	. 64	8, 049	212	5. 02	1, 065	211, 849	84, 525	87, 840	172, 365	384, 214	-17, 045	-38, 739	

¹ Data are for calendar year, except on Salt River project, where data are for corresponding "agricultural year," October, 1930, to September, 1931.

² Equipment on Salt River project estimated.

³ Includes \$80, the value of 10 goats.

⁴ Bitter Root irrigation district being rehabilitated under the act of July 3, 1930.

⁵ Includes \$40,000, the value of 1 purebred sire.

RECLAMATION TABLE 31.—*Inventory of livestock and equipment on reclamation project farms at close of 1931*¹—Continued

State and project	Fowls			Bees (hives)			Total stock value		Value of equipment		Total equipment		Increase or decrease in value over 1930	
	Number	Value		Number	Value		Total	Other	Motor vehicles	Total equipment	Stock	Equipment	Total	
		Each	Total		Each	Total								
Montana-North Dakota:														
Lower Yellowstone.....	21,848	\$0.54	\$11,921	663	\$12.50	\$8,287	\$228,427		\$134,815	\$150,027	\$284,842	—\$64,555	—\$25,048	—\$89,903
District No. 1.....	14,848	.55	8,106	646	12.70	8,205	160,436		98,495	97,865	197,360	—23,413	20,090	6,577
District No. 2.....	7,000	.54	3,815	17	4.82	82	58,991		35,320	32,162	87,482	—41,442	—58,038	—96,480
Nebraska-Wyoming:														
North Platte.....	147,535	0.39	57,469	505	2.69	1,359	1,047,098		844,590	844,590	1,565,214	—204,256	—341,249	—545,505
Pathfinder irrigation district.....	74,811	.35	25,975	186	2.00	372	496,034		319,940	366,185	686,125	—160,778	—449,695	—610,473
Gering and Fort Laramie irrigation district.....	35,733	.44	15,661	101	3.15	319	239,489		255,699	284,970	540,669	—21,537	145,851	124,314
Goshen irrigation district.....	30,650	.40	12,260	178	3.00	534	244,702		123,070	159,200	282,270	—2,105	—25,825	—27,930
Northport irrigation district.....	6,341	.56	3,573	40	3.35	134	66,873		21,915	34,235	56,150	—19,836	—11,580	—31,416
Nevada: Newlands.....	107,642	1.53	164,516	3,924	3.79	14,892	929,333		123,997	271,645	395,642	—355,777	—86,728	—442,505
New Mexico: Carlsbad.....	59,897	1.01	60,735	870	8.63	5,780	333,312		133,055	105,800	238,855	35,185	—62,285	—27,100
New Mexico-Texas:														
Rio Grande.....	161,673	.86	139,921	965	5.65	5,449	1,094,783		753,972	588,039	1,342,911	—369,697	—462,097	—831,794
Elephant Butte irrigation district.....	78,083	.74	58,239	698	5.64	3,937	948,119		293,856	276,756	572,612	—123,315	—203,766	—327,081
El Paso County Water Improvement District No. 1.....	83,590	.98	81,682	267	5.66	1,512	546,664		458,116	312,183	770,299	—246,382	—258,331	—504,713
Oregon:														
Umatilla.....	56,304	1.30	73,047	1,525	4.75	7,232	278,940		56,340	45,226	101,566	—48,274	—6,424	—54,698
East division.....	44,854	1.29	57,833	935	4.91	4,594	194,818		33,990	27,095	61,085	—17,223	—11,890	—29,113
West division.....	11,450	1.33	15,214	590	4.50	2,638	84,122		22,350	18,131	40,481	—31,051	—5,466	—25,585
Vale.....	3,428	1.35	4,631	7	2.14	15	31,220		11,915	14,760	26,675	13,163	10,035	23,198
Oregon-California:														
Klamath.....	59,089	.94	55,331	154	4.17	643	947,063		404,340	267,845	672,185	—146,515	66,185	—80,330
Main division.....	46,719	.90	42,851	100	4.00	407	761,408		292,120	203,065	495,185	—72,424	45,185	—27,239
Tule Lake division.....	12,370	1.00	12,480	54	4.00	236	118,655		112,220	64,780	177,000	—74,091	21,000	—53,091
South Dakota: Belle Fourche.....	41,595	.94	40,336	2,750	5.25	14,438	493,197		163,230	123,352	286,582	—301,560	—149,123	—450,683
Utah: Strawberry Valley.....	208,760	.40	83,504	684	3.00	2,052	436,241		166,190	85,185	251,375	—403,265	—121,320	—530,585
Washington:														
Okanogan.....	5,574	.63	3,494	48	4.56	219	12,559		61,630	144,456	206,086	—5,578	—9,842	—15,420
Yakima.....	248,328	.90	222,514	3,391	4.86	16,501	1,904,493		1,645,554	1,079,993	2,725,147	—68,113	4,629,040	—300,531
Sunnyside division.....	188,932	.93	175,775	3,229	4.90	15,841	1,297,024		1,037,732	246,834	1,541,570	—254,375	2,984,100	—610,374
Tyson division.....	42,357	.77	32,702	87	3.99	347	186,865		455,066	684,524	741,520	—38,113	928,385	—37,026
Kititas division.....	17,039	.82	13,947	75	4.17	313	420,604		153,246	143,305	296,551	224,375	717,155	385,869

Wyoming:

Shoshone	41,350	.89	36,847	2,123	3.72	7,901	268,254	127,964	132,474	260,438	528,722	-91,015	-43,637	-134,652
Gariand division	28,675	.87	24,921	1,575	4.48	7,075	181,654	90,241	79,294	169,535	351,189	-68,952	-25,745	-94,697
Frankie division	8,953	.98	8,863	539	1.50	808	70,352	23,870	43,960	69,530	140,222	-24,421	-19,085	-43,516
Willwood division	3,692	.83	3,063	9	2.00	18	16,238	11,833	9,220	21,073	37,311	2,358	1,203	3,561
Riverton	2,446	.99	2,433	---	---	---	13 14,776	8,250	12,500	20,750	35,526	6,279	1,715	7,994
Totals and averages	2,113,604	.80	1,696,792	34,892	4.27	149,044	16,007,200	7,126,616	5,972,155	13,098,771	29,105,971	-5,906,164	-2,796,542	-8,702,706

¹ Data are for calendar year, except on Salt River project, where data are for corresponding "agricultural year," October, 1930, to September, 1931.

⁹ Includes \$1,024, the value of 925 rabbits.

¹⁰ Includes \$1,014, the value of 905 rabbits.

¹¹ Includes \$10, the value of 20 rabbits.

¹² Includes \$42, the value of 3 goats, and \$9, the value of 13 rabbits.

¹³ Includes \$48, the value of 16 milk goats.

RECLAMATION TABLE 32.—*Projects turned over to water users' organizations for operation and maintenance*

Project	Year	Remarks
Salt River project, Arizona.....	1917	Association operating entire project.
Uncompahgre project, Colorado.....	1932	Do.
Boise project, Idaho.....	1926	United States operating reserved works; board of control operating transferred works.
King Hill project, Idaho.....	1926	District operating entire project.
Minidoka project, Idaho:		
Gravity division.....	1917	United States operating reserved works.
South side pumping division.....	1926	Do.
Huntley project, Montana.....	1928	District operating entire project.
Sun River project, Montana:		
Fort Shaw division.....	1927	} Do.
Greenfields division.....	1931	
Lower Yellowstone project, Montana-North Dakota.	1932	Districts operating entire project.
North Platte project, Nebraska-Wyoming:		
Interstate division.....	1926	United States operating reserved works.
Northport division.....	1927	Do.
Fort Laramie division.....	1927	Do.
Newlands project, Nevada.....	1927	District operating entire project.
Umatilla project, Oregon.....	1926	Districts operating entire project, except McKay Reservoir.
Salt Lake Basin project, Utah: First division.	1932	Association operating entire project.
Strawberry Valley project, Utah.....	1927	Do.
Okanogan project, Washington.....	1929	District operating entire project.
Shoshone project, Wyoming:		
Garland division.....	1927	United States operating reserved works.
Frannie division.....	1930	Do.

RECLAMATION TABLE 33.—*Projects to be turned over to water users' organizations for operation and maintenance*

Project	Year	Remarks
Grand Valley project, Colorado.....	1937	Contract executed.
Milk River project, Montana.....	1936	Certain works to be reserved.
Vale project, Oregon.....	-----	Project will be transferred upon completion of construction.
Owyhee project, Oregon-Idaho.....	-----	Do.
Belle Fourche project, South Dakota.....	1934	Contract executed. Entire project will be transferred.
Yakima project, Washington: Kittitas division.	1933	Contract executed.

I N D E X

A

	Page
Accounts receivable, construction water-right charges (including contributed funds)-----	84
Accounts receivable, operation and maintenance charges (after public notice)-----	85
Accounts receivable, rental of irrigation water-----	86
Accretions to reclamation fund, by States-----	79
Adjustment contracts-----	10
All-American Canal-----	31
Area possibly susceptible of irrigation-----	97
Available funds, expenditures, and balances-----	78

B

Baker project, Oregon-----	48
Balances, available funds, and expenditures-----	78
Beaverhead River investigations, Montana-----	68
Belle Fourche project, South Dakota-----	52
Bitter Root project, Montana-----	36
Boise project, Idaho-----	34
Boise project, Salmon River diversion, Idaho-----	65
Boise project, Twin Springs Reservoir investigations, Idaho-----	64
Boulder Canyon project act, investigations under section 15-----	76
Boulder Canyon project, Arizona-Nevada-----	27, 29
Boulder Canyon project, capital investment, June 30, 1932-----	89
Boulder Canyon project, financial statement, June 30, 1932-----	88
Boulder Canyon project, second year's progress on-----	2
Boulder City, Nev-----	4
Burbank project, Washington-----	72

C

Cache Valley project, Utah-----	70
Carlsbad project, New Mexico-----	46
Collections, expenditures, net investment to June 30, 1932-----	87
Colorado River Basin investigations-----	76
Columbia Basin project, Washington-----	73
Construction cost, other cost reimbursable with construction, and repayments by water users-----	80
Construction on reclamation projects during fiscal year-----	4
Construction results, summary of, to June 30, 1932-----	99
Construction water-right charges (including contributed funds)-----	84
Contracts-----	22
Contracts for sale of power in force June 30, 1932-----	102
Crop results, summary of-----	113
Crop values-----	128
Crop values, irrigated and cropped acreage, by years, 1906-1931-----	114

	Page
Crop yields.....	122
Cropped and irrigated acreage and crop values by years, 1906-1931.....	114
Cropped areas.....	115
D	
Dams, diversion.....	95
Dams, storage.....	93
Denver office activities.....	29
Drainage work (summary of) and estimate of seepage to June 30, 1932.....	107
E	
Economic and engineering operations.....	23
Economic and settlement data.....	109-141
Economic depression and its effect on reclamation income.....	5
Engineering data for projects on completion.....	92-108
Ephraim investigations, Utah.....	72
Executive heads of Bureau of Reclamation.....	iv
Expenditures, available funds, and balances.....	78
Expenditures, collections, net investment to June 30, 1932.....	87
F	
Farm units opened to entry.....	22
Federal reclamation, effect of, on national welfare.....	7
Federal reclamation projects as homes for unemployed.....	9
Financial data.....	77-91
Financial data, consolidated.....	77
G	
Gooseberry Reservoir, Utah.....	72
Grand Valley project, Colorado.....	33
H	
Historical statement.....	ii
Homes for unemployed on Federal reclamation projects.....	9
Hoover Dam, Boulder Canyon project, Arizona-Nevada.....	27, 29
Humboldt River investigations, Nevada.....	68
Huntley project, Montana.....	38
I	
Industries (western) growing faster than western farms.....	20
Introductory statement.....	1
Investment (net), expenditures, collections to June 30, 1932.....	87
Irrigated and cropped acreage and crop values, by years 1906-1931.....	114
Irrigation and crop results.....	110
K	
Kennewick division, Yakima project, Washington.....	59
King Hill project, Idaho.....	35
Kittitas division, Yakima project, Washington.....	57
Klamath project, Oregon-California.....	50
L	
LaGrande investigations, Oregon.....	69
Letter of transmittal.....	iii

Livestock and equipment on Federal irrigation projects.....	Page 134
Livestock and equipment on project farms, inventory of.....	135
Lower Yellowstone project, Montana-North Dakota.....	41

M

Middle Rio Grande investigations, New Mexico.....	68
Milk River project, Montana.....	39
Minidoka project, Idaho.....	35
Moon Lake investigations, Utah.....	71
Moratorium for water users.....	9
Musselshell River Basin, Montana.....	67

N

National welfare, effect of Federal reclamation on.....	7
Newlands project, Nevada.....	43
North Platte project, Nebraska-Wyoming.....	42
North Platte River power investigations, Wyoming.....	75

O

Ogden River division, Utah.....	71
Okanogan project, Washington.....	55
Operation and maintenance charges (after public notice).....	85
Operation and maintenance cost, returns and other credits, and results, 1931, by projects.....	82
Operation and maintenance cost, returns and other credits, and results to December 31, 1931.....	83
Orland project, California.....	32
Oroville-Tonasket irrigation district, Washington.....	72
Owyhee project, Oregon-Idaho.....	51

P

Power development an important factor in future extension of reclamation.....	12
Power development and power income.....	13
Power plants operated.....	101
Power policy.....	16
Private development, Reclamation Bureau supplements.....	19
Projects to be turned over to water users' organizations for operation and maintenance.....	142
Projects turned over to water users' organizations for operation and maintenance.....	142
Provo River division, Utah.....	70
Pumping plants operated.....	104

R

Rathdrum Prairie investigations, Idaho.....	65
Reclamation Bureau supplements private development.....	19
Reclamation fund, accretions to, by States.....	79
Reclamation policy for immediate future.....	18
Remedial legislation required.....	17
Rental of irrigation water.....	86
Repayments, contracts for, should be fulfilled.....	21
Reservoirs.....	92

	Page
Rio Grande project, New Mexico-Texas.....	46
Riverton project, Wyoming.....	60
Rush Lake investigations, Utah.....	71

S

Sacramento-San Joaquin Valley investigations, California.....	64
Salt Lake Basin project, Utah.....	53
Salt River project, Arizona.....	23
Secondary investigations.....	63
Secondary investigations, cost of, fiscal year 1932.....	75
Seepage (estimate of) and summary of drainage work to June 30, 1932....	107
Settlement and economic data.....	109-141
Shoshone project extensions, Wyoming.....	74
Shoshone project, Wyoming.....	61
Storage division, Yakima project, Washington.....	59
Strawberry Valley project, Utah.....	55
Suggestions for project betterments.....	6
Sun River project, Montana.....	40
Sunnyside and Tieton divisions, Yakima project, Washington.....	56

T

Tables.....	77-142
Tieton and Sunnyside divisions, Yakima project, Washington.....	56
Tongue River investigations, Montana.....	67

U

Umatilla project, Oregon.....	49
Uncompahgre project, Colorado.....	33
Unemployed, Federal Reclamation projects as homes for.....	9
Upper Snake River investigations, Idaho.....	67
Utah, cooperative investigations.....	69

V

Vale project, Oregon.....	49
Victory irrigation district, Big Horn River, Mont.....	68
Voucher transactions, all funds, and net investment as of June 30, 1932..	87

W

Weber River division, Salt Lake Basin project, Utah.....	53
Western industries growing faster than Western farms.....	20

Y

Yakima project, Washington.....	56
Yuma project, Arizona-California.....	25

O



